# **QUALITY AUDIT REPORT**

# ON

# **GREEN CAMPUS MANAGEMENT AUDIT**

OF

# THE OXFORD COLLEGE OF ENGINEERING 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



ENHANCING RESOURCE EFFICIENCY

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# OF

# 'THE OXFORD COLLEGE OF ENGINEERING'

# 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



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## For More Information

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# **ACKNOWLEDGEMENTS**

We are thankful to the management of **The Oxford College of Engineering**, **Bengaluru**, for the support, guidance and, giving us the opportunity to be involved in this very interesting and challenging assignment.

We would be happy to provide any further clarifications, if required, to facilitate the implementation of the recommendations.

We received full co-operation and support from the concerned personnel/ staff members of the college. We would like to thank:

Chairman – The Oxford Educational Institutions

The Oxford College of Engineering

And other Staff in personnel who have given full co-operation and support. They took a keen interest and gave valuable inputs during the course of study.



# EEELLP ACKNOWLEDGEMENT

EEELLP team thanks the management of **The Oxford College of Engineering, Bengaluru** for assigning this interesting work to us. We appreciate the co-operation extended to our team during the entire process.

Our special thanks are due to Principal & Team of colleagues for giving us necessary inputs to carry out this very vital exercise. We would like to thank all the head of the departments and staff members who were actively involved while collecting the data and conducting field measurements.

# DISCLAIMER

The Audit Team has prepared this report for The Oxford College of Engineering, Bengaluru based on the input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

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

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

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# **ABBREVIATION AND ACRONYMS**

1.	А	:	Amperes
2.	AC	:	Air Conditioner
3.	APFC	:	Automatic Power Factor Controller
4.	AMF	:	Automatic Mains Failure
5.	BBMP	:	Bruhat Bengaluru Mahanagara Palike
6.	BESCOM	:	Bangalore Electricity Supply Company
7.	BWSSB	:	Bangalore Water Supply and Sewerage Board
8.	CC Camera	:	Closed Circuit Camera
9.	DG	:	Diesel Generators
10.	EE Fan	:	Energy Efficient Fan
11.	E-Waste	:	Electronic Waste
12.	FTL	:	Fluorescent Tube Light
13.	GHG	:	Green House Gas
14.	Hz	:	Hertz
15.	HP	:	Horse Power
16.	ΗT	:	High Tension
17.	Ι	:	Current
18.	ICT	:	Information and Communications Technology
19.	IQAC	:	Internal Quality Assurance Cell
20.	ISO	:	International Organization for Standardization
21.	kgs	:	Kilograms
22.	kL	:	Kilo Liters
23.	kV	:	kilo volt
24.	kVA	:	kilo volt ampere
25.	kVAr	:	Reactive kilo volt ampere
26.	kW	:	Kilo Watt
27.	kWh	:	kilo Watt hour
28.	kWp	:	kilo Watt peak
29.	LCD	:	Liquid Crystal Display
30.	LED	:	Light Emitting Diode
31.	LT	:	Low Tension
32.	mA	:	Milli Amperes
33.	MoU	:	Memorandum of Understanding
34.	NA	:	Not Applicable
35.	NAAC	:	National Assessment and Accreditation Council
36.	NSS	:	National Service Scheme
37.	OHT	:	Over Head Tank
38.	Prim/Sec	:	Primary/Secondary
39.	PF	:	Power factor
40.	Ph.D.	:	Doctor of Philosophy

41.	PV	:	Photo Voltaic
42.	RCC	:	Reinforced Cement Concrete
43.	RO	:	Reverse Osmosis
44.	RR. No.	:	Revenue Register Number.
45.	Sq. Ft.	:	Square Feet
46.	Sq.m.	:	Square Meter
47.	SRTPV	:	Solar Roof Top Photo Voltaic
48.	TL	:	Tube Light
49.	TR	:	Ton of Refrigeration
50.	ΤV	:	Television
51.	V	:	Volts
52.	W	:	Watts
53.	Wi-Fi	:	Wireless Fidelity
54.	Wp	:	Watt peak
55.	#	:	Number

# **1. INTRODUCTION**

The Oxford College of Engineering was started in the year 2000, is one of the most prestigious institutions in Bengaluru that provides quality teaching and training in professional UG courses in 10 streams of Engineering in, Computer Science, AIML, Electronics and Communication, Electrical and Electronics, Mechanical, Civil, Bio-Technology, Mechatronics & Automobile. College also offers 10 Postgraduate programs in Technology (M. Tech), Computer Application (MCA) and Business Administration (MBA), and 11 Research centers recognized by VTU to offer Ph.D. programs. College is affiliated with the Visvesvaraya Technological University (VTU) and approved by the All-India Council for Technical Education (AICTE). The college also has been accredited by the NBA, and IAO quality-assessed organizations. The Institute name is also included in the NIRF & AICTE CII Survey of Industry Linked Technical Institute- 2020. Institution is categorized in Band promising in ARIIA ranking in the year 2021. The college is set in a sprawling 11.5 acres campus in the prestigious IT corridor, ideal for education in a serene environment with over 85,000 square meters of built-up area spread over 2 blocks, with enormous investment for academic purposes. The college has well equipped with state-ofthe-art infrastructure facilities to carry out various real-time projects, research, and consultancy activities in recent technologies. All the Departments have undertaken many research/consultancy projects funded both by multinationals and government agencies. The college has a good number of research publications in various reputed journals and patents. College has a good number of R&D projects sponsored by AICTE, VGST, VTU, IEEE, ICMR BRNS, NIF, NRB(DRDO) & BIRAC. It has a history of excellent placement track record in various multinational companies' offers with high salary packages.

### VISION

To develop competent students with good value systems and face challenges of the continuously changing world.

### MISSION

To be respected and most sought-after engineering educational institutions engaged in equipping individuals capable of building learning organizations in the new millennium.

## **QUALITY POLICY**

To equip the students with highest standard of education, knowledge and ethics. To prepare them to meet the challenges of life with full confidence. Aim at all round development of the personality to be useful citizens.

## Campus Area and Built-up area

The area of the campus (built up and total) area is given in table 1-1.

S. Description No.		Units	Details
1	Engineering Campus total area	Acres	11.5
2	Built up area	Sq. mt.	85,000

## Table 1-1: College Area

### Committee and Cells

The Oxford College of Engineering (TOCE) has various functional committees and cells. They are listed below,

- VTU/AICTE Committee
- Planning & Accreditation Committee
- o Library Committee
- o Research and Development Committee
- o Training & Placement Committee
- o Faculty Development Committee
- o Purchase & Budget Committee
- o College Magazine/Calendar /Newsletter Committee
- o Professional Societies / Chapters
- o Cultural Association

- o Alumni Association
- o Sports Committee
- o NSS
- o Students Grievances Redressal Committee
- o Discipline Committee
- o Women's Grievance Redressal Committee
- o Anti-sexual Harassment Committee
- o Entrepreneurship & Incubation cell
- o Anti-Ragging Committee
- o Website, Server & Internet Committee
- o Public Relation Committee
- o Hostel & Canteen Committee
- o Prevention of Caste Based Discrimination Cell
- o College Internal Complaints Committee
- o Internal Task Force Team COVID 19 Coordination Committee
- o Internal Quality Assurance Cell (IQAC)
- o Exam Cell
- o Disability Recourse Centre
- o IPR Cell
- o IA Answer Scripts Evaluation Review Committee
- o IA Question Paper Scrutiny Committee

### Internal Quality Assurance Cell (IQAC)

The college management constitutes the Internal Quality Assurance Cell including Principal, teaching faculty, non-teaching faculty, UG students (Male & Female), PG students (Male & Female), alumni, parent and industry representatives every year.

The list of Internal Quality Assurance Cell members for the academic year 2016-2017 is shown in figure 1-1.



#### Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2016

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SLNo	Name of Member	Designation	Role
1.	Dr. Praveena Gowda	Principal	Chairperson
2.	Dr. Malleshalah T.S.	Professor, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs. Uma	Office Staff	Member – Non Teaching Faculty Representative
4.	Ms. Shilpa	ECE Student	Member – UG Female Student Representative
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student member Representative
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member – Alumni Representative
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative
11.	Dr. Mallikarjun K	Professor & Head Maths	Member - Coordinator
12.	Prof.Devi Vighneshwari	Asst. Prof in EEE	Joint Coordinator
	Copy to: 1. Chairman and Vice 2. Committee Membe 3. All the HOD's 4. IQAC File	Chairman	Principal & Chairperson IQAC PRINCIPAL e Oxford College of Engineering Bommanehal%, Hosur Road Bongaturu-550 068

Figure 1-1: List of IQAC members 2016-2017

The list of Internal Quality Assurance Cell members for the academic year 2017-2018 is shown in figure 1-2.



Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2017

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will er orders are issued. Following is the constitution of IQAC.

	De on sanc of Mamber	Designation	nore
SI.No	Name of Member	Reference	Chairperson
1. Dr. Praveena Gowda		Professor, Dept. of Civil Eng.	Member -Teaching Faculty
-	Dr. Malleshalah 1.3.	Office	Member - Non Teaching Faculty
	Mrs. Uma	Staff	Member - UG Female Student
4.	Ms. Shilpa	ECE Student	Representative
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student member Representative
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker	Member – Alumni Representative
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member – Parent Representative
10. Mr. Shamin Dudu		General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative
	De Mallibarius K	Professor & Head Maths	Member - Coordinator
11.	Deel Davi Viebneshwari	Asst. Prof in EEE	Joint Coordinator
14-	Protoceri viginicanitani		And

Copy to: 1. Chairmanand Vice Chairman

4. IQAC File

2. Committee Members 3. All the HOD's



The Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-560 068

Figure 1-2: List of IQAC members 2017-2018

The list of Internal Quality Assurance Cell members for the academic year 2018-2019 is shown in figure 1-3.



#### Proceedings of the Principal and Chairperson IQAC

Order

#### Date: 27/07/2018

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SI.No	Name of Member	Designation	Role	
1.	Dr.Praveena Gowda	Principal	Chairperson	
2.	Dr. Malleshaiah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative	
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative	
4.	Ms.Ashmitha Dale Pais	CSE Student	Member – UG Female Student Representative	
5.	Mr.Vishal Nadig	EEE Student	Member – UG Male Student Representative	
6.	Ms.Dechekka K U	MBA Student	Member – PG Female Student Representative	
7.	Mr.Manoj P	MCA Student	Member – PG Male Student member Representative	
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative	
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative	
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative	
11	Dr. Mallikariun K	Professor& Head Maths	Member - Coordinator	
12	Prof Devi Viehoeshwari	Asst. Prof in EEE	Joint Coordinator	

#### Copy to:

1. Chairman and Vice Chairman

2. Committee Members

3. All the HOD's

4. IQAC File



Principal'& Chairperson IQAC PRINCIPAL Ine Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-550 068.

### Figure 1-3: List of IQAC members 2018-2019

The list of Internal Quality Assurance Cell members for the academic year 2019-2020 is shown in figure 1-4.



Proceedings of the Principal and Chairperson IQAC Order

Date: 27/07/2019

By the direction of the Governing body, undersigned is pleased to reconstitute internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will ed. Following is the constitution of IQAC

	be on same until further o	Designation	Role				
1.No	Name of Member	Principal .	Chairperson				
1.	Dr.A.S.Aravind	Principal	Member -Teaching Faculty				
2.	Dr. Malleshalah T.S	Head, Dept. of Civil Eng.	Representative				
	Dr. Wateshearthy		Member - Non Teaching Faculty				
3.	Mrs.Uma	Office Staff	Representative				
	The store is a store i		Member – UG Female Student				
4.	Ms Ashmitha Dale Pais	CSE Student	Representative				
			Member - UG Male Student				
5. M	Mr VishalNadig	EEE Student	Representative				
	Na. The start of t		Member - PG Female Student				
6.	Ata Duchakka KU	MBA Student	Representative				
	MS.Decretka H o		Member - PG Male Student				
7.	Mar Manol P	MCA Student	member Representative				
	Wir,manoj *	Cooler Collupte Engineer, Netcracker	Mambar - Alumni Representative				
8.	Mr Srinkas AS	Technologies Bangalore	Memoer - Addition representation				
	Ma Standar	Recent (of Male)	Member -Parent Representative				
9.	Mr.C.Prakash	Parent (of Female)					
	Mr.B.R.MHemaMaheshwar	Parent (or remain)					
10		General Manager, Power Train &	Member - Industry Representative				
	Mr Shamin Dudu	Emobility, Robert BOSCH Engineering a	includer instant inspection				
		Business Solutions Lto, Bangalore					
11.	Dr. Shashidhar	Professor & Head MCA	Member - Coordinator				
			Joint Cogrdinator				
12	Prof Devi Vighneshwari	Asst. Prof in EEE	and al al summer				

#### Copy to:

1. Chairmanand Vice Chairman

- 2. Committee Members 3. All the HOD's
- 4. IQAC File

PRINCIPAL Bernmanshalli, Hosur Road Bengaluru-560 068.

Figure 1-4: List of IQAC members 2019-2020

The list of Internal Quality Assurance Cell members for the academic year 2020-2021 is shown in figure 1-5.





Proceedings of the Principal and Chairperson IQAC Order

Date:17/08/2020 By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Followides it the constitution of DOC

SI No.	Name of Member	Designation	Role
1.	Dr.A.S.Aravind	Principal	Chairperson
2.	Dr. Malleshalah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative
4,	Ms.Sahana H G	CSE Student	Member – UG Female Student Representative
5.	Mr.Dildar Bashir	EEE Student	Member – UG Male Student Representative
6.	Ms. Dhanyatha K	MBA Student	Member – PG Female Student Representative
7.	Mr.Anmol	MCA Student	Member – PG Male Student member Representative
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative
11.	Dr. Mallikarjun K	Professor& Head Maths	Member - Coordinator
12	Prof.Devi Vighneshwari	Asst. Prof In EEE	Joint Coordinator
Cop 1 2 1 4	y to: Chairman and Yoe Chairman Conneittee Members Al the HOO KQAC File	College or call of the On Bormanshall Hosur Road	PRINCIPAL ford College of Engineering mmanahalli, Hotur Road Bengaluru-550 065

Figure 1-5: List of IQAC members 2020-2021

## **Overview of Quality Audit:**

Quality Audit helps college / facility to:

- Understand the usage of electricity, water and other natural resources
- Identify opportunities to conserve various natural resources
- Identify various technological improvements
- Evaluate the techno-commercial of identified conservative measures
- Create awareness among the students and staff
- Disseminate the commitment of management towards saving nature
- Develop a culture among students, staff and management to be socially responsible

# 2. PRE – AUDIT PHASE

A Pre-audit meeting is a prerequisite for the audit, it helps to meet and discuss about the schedule and documents required during the audit. The pre-audit meeting was conducted at The Oxford College of Engineering. During the meeting, introduction of team members, scope and objectives of the audit were discussed.

### Management Commitment

The Management of the college has shown great commitment towards Quality Audit during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the Quality Auditing.

College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

## Scope and Goals of Quality Auditing

A clean and healthy environment aids effective learning and provides conducive learning environment. There are various efforts around the world to address environmental education issues. Quality auditing is one among them for educational institutions.

Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects.

This data will also provide a basis for calculating the economic benefits of resource conservation projects, by establishing the current rates of resource use and their associated costs. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self-audits.

# 3. **ON-SITE AUDIT PHASE**

# 3.1. Scope / Target Areas of Quality Auditing

# 3.1.1. Water Audit

Water Audit addresses water consumption, water sources, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

# 3.1.2. Energy Audit

Energy Audit addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability.

# 3.1.3. Waste Management Audit

Waste Audit addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

# 3.1.4. Green Campus Management Audit

Green campus initiatives are becoming an integral part of modern day's university systems. Green campus Audit helps in maintaining the air and water clean. It regulates the climatic conditions and provides a healthy and comfortable environment for living.

# 3.1.5. Environment Footprint Audit

Environment Footprint Audit addresses the usage of fossil fuels (coal, diesel, petrol and gas). The mode of commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels.

# 3.2. Audit Methodology and Approach

The methodology and approach adopted for the study involve various steps that include:

- Review of Document and records
- Review of Policies
- Review of MoU
- Review of various measures implemented
- Site Walkthrough
- Data Collection
- Interviews

# 3.2.1. Review of Document and Records

The various documents and records such as:

- o Electricity bills
- Water bills
- Equipment registers
- List of appliances
- o Internal Quality Audit document
- o Purchase document
- Cash payment receipts
- o Equipment service report
- o Maintenance and service payment receipts

were reviewed and, relevant data and inputs required for analysis have been collected.

## 3.2.2. Review of Policies

College has various policies that include safety policy and Anti-ragging policy.

## A. Safety Policy:

All the students, teaching staff, non-teaching staff, maintenance and house-keeping staff have been given training to use fire extinguishers in emergency situations of fire and explosion. Fire hydrant system is available at the campus. Also, fire extinguishing cylinders have been installed in each floor and in laboratory areas. Fire order statements and use of fire extinguisher has been posted at each block. Fire alarm is also installed at the premises. Photos of fire order and fire alarm are shown in figure 3-1 and 3-2.







Figure 3-2: Fire alarm panel at engineering old block

## B. Anti-Ragging policy:

Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, hostel, sports, canteen, etc.) whether located within the campus or outside and in all means of transportation of students whether public or private. **'Say No to Ragging'** poster is placed in each block of the campus and a sample photo is as shown in the figure 3-3.



Figure 3-3: Anti-ragging poster

## 3.2.3. Review of various measures implemented

During the Quality Audit study, it was observed the college has taken various initiatives in conserving natural resources that include:

- Internal Quality Assurance Cell including Staff, Students, Alumni, parents and industrial members.
- Installation of Solar Roof Top Photo Voltaic (SRTPV) system for power generation.
- Wheeling to grid is done.
- Installation of LED fixtures to reduce electricity consumption
- Installation of LCD/LED monitors for all the desktops to conserve electricity
- Switching OFF lights and fans whenever not in use to save electricity
- Installation of RO plant to provide purified drinking water.
- Dual water piping system for washrooms and toilets, to use STP treated water for flushing
- Sewage treatment and using the treated final water for toilet flushing, gardening and cleaning purposes
- Rain water harvesting system is available in the campus.
- Regular testing of STP treated water quality parameters
- Dedicated watering system for greeneries.
- The use of sign boards in all the wash rooms were observed, to create awareness for water conservation
- Installation of waste segregation bins at all the rooms to separate the dry and wet waste
- Maintenance of logbooks and registers is done properly.
- Training is conducted on regular basis regarding usage of fire extinguisher, conservation of resources such as electricity, water, food and green campus.
- Maintenance team is available for electrical, plumbing, waste management and green campus management.

## 3.2.4. Site walk through

Site walk through was conducted with staff members, students and audit team members. Staff and students have shown very keen interest in the data collection process and methods to be followed in field data collection. The staff and students have given inputs and suggestions for resource conservation as well.

## **College Infrastructure**

The Oxford College of Engineering campus has various blocks and departments. Each floor has state of the art class rooms, staff rooms, laboratories, libraries and many more. Details of infrastructure are as follows:

- 0 Inhouse hostel for boys and girls
- o Bank facility
- o 24 hrs. atm in the campus
- o Solar plant
- o Rain water harvesting
- o RO water facility
- 0 Lifts & ramps
- o Cafeteria
- o Gymnasium
- o Cricket stadium / basketball court / badminton court
- Wi-Fi facility in the campus
- o CCTV security
- Telephone and fax facility
- o Photocopying facility
- The oxford enterprises (stationery)
- 0 Library

- 0 Digital library
- o Extended library hours
- o Hospital facility
- o Free dental treatment
- o First aid, medical and counseling facility
- 0 Scholarships
- o Group insurance
- 0 Placements
- o Placements training
- o English language coaching
- o Add-on courses
- o Cloud based ERP for students
- 0 Transport
- Parking facility
- o Cultural activities center
- o Incubation Centre for research activity
- o Staff room
- o Smart class rooms
- o Conference room
- o Student common room
- o Green campus

# 3.2.5. Inventory Collection

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, computers, projectors, printers, scanners etc., The consolidated list of inventories is given in table 3-1.

		Flore Tube	escent Light	LE	D	CFL	Fa	n	Cor	nputer	Exha	_	<b>D</b> · · ·	Xer	сс	τν	<b>n</b> .		
S. No.	Dept	40 <del>v</del>	 MOR (36₩)	18₩ Tub e	12 ₩		Ceiling Fan	∀all moun tFan	LED /LCD Monito	CRT Monitors	ust Fans	ocan ners	ers	ox Mac hine	Came ra	Scre en	Proje ctor	AC	Refridg erator
1	AUTO ENGG	64	0	12	0	0	26	6	5	0	0	1	2	0	0	0	1	0	
2	BT	86	0	0	0	0	42	0	10	9	2	2	2	2	8	0	1	2	4
3	Chemistry	0	0	17	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
4	CSE	52	0	141	0	0	59	13	3	218	0	0	0	4	0	12	0	5	1
5	Civil	52	0	16	0	0	56	4	30	0	0	1	3	0	0	0	0	0	
6	ECE	81	0	0	0	0	44	11	48	0	3	0	4	0	7	0	3	1	
7	EEE	48	2	0	6	0	54	2	41	0	0	0	2	0	7	0	1	0	0
8	ISE	34	0	77	0	0	29	5	128	0	0	0	2	0	0	0	1	0	
9	Library	0	45	0	0	0	53	0	30	0	0	1	1	0	0	0	0	0	
10	Maths	16	0	0	0	0	14	1	5	0	0	0	7	0	0	0	0	0	
11	MBA	39	0	0	0	96	42	0	16	0	0	0	2	0	0	0	3	3	
12	MCA	51	0	0	0	0	31	0	242	0	0	0	2	0	3	0	0	9	
13	MECH	89	0	0	0	0	59	0	84	0	2	0	2	0	5	2	3	0	
14	MTE	24	0	0	0	0	19	0	3	0	0	0	1	0	4	0	1	0	
15	PHYSICS	39	0	0	0	0	27	1	2	0	0	0	1	0	6	0	0	0	
Tot	al (College)	675	47	263	6	96	567	43	647	227	7	5	31	6	40	14	14	20	5
То	tal(Hostel)	413	0	71	0	0	431	0	1	0	0	0	1	0	0	0	0	0	0
Tot	tal (Overall)	1088	47	334	6	96	998	43	648	227	7	5	32	6	40	14	14	20	5

Table 3-1: Consolidated list of inventories

## 3.2.6. Interviews

To collect the various data, information and operating patterns, interviews were conducted with college staff (Principal, teaching staff, non-teaching staff) and students. The consolidated information from the interviews is given in the following sub-sections.

### 3.2.6.1. List of Holidays:

The lists of holidays were collected during the study and the same is given below. The list of holidays for the year 2017 is shown in figure 3-4.

No.: CI	D: 3	te No. 40, 30 <sup>m</sup> Mi (Recognize 0410501/502, Fax	ain, 1° Phase, J.P. Nagar, Bangalore -560 078. d by Government of Karnataka) c: 30410569 E-mail: info@theoxford.cdu
	ES/PAYROLL/	01/2016-17	Date: 06-01-201
		NO	TIFICATION
	Sub: Gener	al Holidays de	clared by the Government of Karnataka
	for th	e Calendar Ye	ar 2017.
Karnat Educa	The following i taka for the C tional Institution	is the list of h Calendar Year ons also.	polidays declared by the Government of 2017 as applicable for all The Oxford
SLNo	Date	Day	Occasion
1.	14-01-2017	Saturday	Uttarayana Punya Kala Sankranti Festiva
2.	26-01-2017	Thursday	Republic Day
3.	24-02-2017	Friday	Maha Shivaratri
4.	29-03-2017	Wednesday	Chandramana Ugadi
5.	14-04-2017	Friday	Good Friday & Dr. B.R.Ambedkar Jayanthi
6.	29-04-2017	Saturday	Basava Jayanthi
7.	01-05-2017	Monday	May Day
8.	26-06-2017	Monday	Kutub-E-Ramzan
9.	15-08-2017	Tuesday	Independence day
10.	25-08-2017	Friday	Varasiddhi Vinayaka Vrata
11.	02-09-2017	Saturday	Bakrid
12.	19-09-2017	Tuesday	Mahalava Amavasye
	29-09-2017	Friday	Maha Navami Ayudapooja
13.	30-09-2017	Saturday	Vijayadasami
13.		Monday	Gandhi Jayanthi
13. 14. 15.	02-10-2017		
13. 14. 15. 16.	02-10-2017 05-10-2017	Thursday	Maharshi Valmiki Jayanthi
13. 14. 15. 16. 17.	02-10-2017 05-10-2017 18-10-2017	Wednesday	Maharshi Valmiki Jayanti Naraka Chaturdashi
13. 14. 15. 16. 17. 18.	02-10-2017 05-10-2017 18-10-2017 20-10-2017	Thursday Wednesday Friday	Maharshi Vaimiki Jayanun Naraka Chaturdashi Balipadyami Deepavali
13. 14. 15. 16. 17. 18. 19.	02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017	Thursday Wednesday Friday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava
13. 14. 15. 16. 17. 18. 19. 20.	02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017	Thursday Wednesday Friday Wednesday Monday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi
13. 14. 15. 16. 17. 18. 19. 20. 21.	02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017 01-12-2017	Thursday Wednesday Friday Wednesday Monday Friday	Maharshi Valmiki Jayahni Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi Id-Meelad

Figure 3-4: List of Holidays-2017

## The list of holidays for the year 2018 is shown in figure 3-5.

G		(Regn.No. 284/74-75) THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1 <sup>th</sup> Phase, J.P. Nagar, Bangalore -560 078. (Recognized by Government of Karnataka) ©: 30410501/502, Fax: 30410569 E-mail: <u>info@theoxford.edu</u>						
	No.: C	ES/111/GH/2	2017-18 NO	Date: 12-12-2017 DTIFICATION				
~		Sub: Gener for th	ral Holidays d ae Calendar Ye	eclared by the Government of Karnataka ear 2018.				
	Govern The O	The following nment of Karn xford Educatio	is the list ataka for the nal Institution	of General Holidays declared by the Calendar Year 2018 as applicable for all s also.				
	Sl.No	Date	Day	Occasion .				
	1.	15-01-2018	Monday	Uttarayana Punya Kala/Sankranti Festiva				
	2.	26-01-2018	Friday	Republic Day				
	3.	13-02-2018	Tuesday	Maha Shivaratri				
	4.	29-03-2018	Thursday	Mahaveera Jayanthi				
	5.	30-03-2018	Friday	Good Friday				
	6,	18-04-2018	Wednesday	Basaya Jayanthi				
	7.	01-05-2018	Tuesday	May Day				
	8.	16-06-2018	Saturday	Kutub-e-Ramzan				
	9.	15-08-2018	Wednesday	Independence day				
	10.	22-08-2018	Wednesday	Bakrid				
	11.	13-09-2018	Thursday	Varasiddhi Vinayaka Vrata				
	12.	21-09-2018	Friday	Last day of Moharam				
	13.	02-10-2018	Tuesday	Gandhi Jayanthi				
	14.	08-10-2018	Monday	Mahalaya Amayasye				
	15.	18-10-2018	Thursday	Maha Navami, Ayudhapooja				
	16.	19-10-2018	Friday	Vijavadashami				
	17.	24-10-2018	Wednesday	Maharshi Valmiki Jayanthi				
	18.	01-11-2018	Thursday	Kannada Raivosthava				
	19.	06-11-2018	Tuesday	Naraka Chaturdashi				
	20.	08-11-2018	Thursday	Balipadyami, Deepavali				
	21.	21-11-2018	Wednesday	Id-Mcclad				
	22.	26-11-2018	Monday	Kanakadasa Jayanthi				
	23.	25-12-2018	Tuesday	Christmas Day				

shall be automatically applicable. Casual Leave or Earned Leave shall not be sanctioned in combination with any holidays.

-	1 2	SE
SNVL.	NARASIMHA	RAJU
	PRESIDENT	

To All the Heads of The Oxford Educational Institutions.

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Figure 3-5: List of Holidays-2018

The list of holidays for the year 2019 is shown in figure 3-6.



This list does not include Dr. Ambedkar Jayanthi, Maharshi Valmiki Jayanthi, Naraka Chathurdashi & Id-e-Milad which fall on 14-04-2019, 13-10-2019, 27-10-2019 and 10-11-2019 falling on Sundays respectively.

If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays.

1	- Lubba
SNVL.	NARASIMHA RAJU PRESIDENT

To

Figure 3-6: List of Holidays-2019
The list of holidays for the year 2020 is shown in figure 3-7.

0		CHILDREN'S EDUCATION SOCIETY (Regd.) (tagn.No. 254/74-75) THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1" Phase, J.P. Nagar, Basgalore - 560 078. (Recognized by Government of Karmataka) (3) 30410501/502, Fax: 30410569 E-mail: info@thecesford.edu					
12.0		111/68/201	9-20	Date: 01-01-2020			
Person Pro-	10.1 CEO		N	DTIFICATION			
	Su The S	b: General Ho for the Cal	lidays decla endar Year	ared by the Government of Karnataka 2020. eral Holidays declared by the Government of crail Holidays for all The Oxford Educational			
Ka	mataka	for the Calend	ar Year 2020	as application for			
ins	titutions	also.	Den	Occasion			
	SLNo.	Date	Day	Littarayana Punya Kala/Makara Sankranti			
and a second	V	15-01-2020	Wednesday	Maha Shivaratri			
	V.	21-02-2020	Friday	Ueadi			
	12	25-03-2020	Wednesday	Mahaveern Javanthi			
	3	06-04-2020	Monday	Good Friday			
	150	10-04-2020	Friday	Dr. BR Ambedkar Jayanthi			
10.00	3.6.	14-04-2020	Tuesday	Man Day			
	P.	01-05-2020	Friday	Party Day			
-ditte.	0.8	25-05-2020	Monday	Retaid			
· 200.	8	01-08-2020	Saturday	Jaking Jacob Day			
	18.2	15-08-2020	Saturday	Canasha Chathurthi			
a state of the second	- 11	22-08-2020	Saturday	Mahelava Amayasye			
and in the second	18.	17-09-2020	Thursday	Mahathma Gandhi Jayanthi			
1.1	13.	02-10-2020	Monday	Vilava Dhashami			
1.1	X.	26-10-2020	Monday	Id.e.Milad			
1935000	10.	30-10-2020	Friday	Valmiki Javanthi			
AL COURSE	16.	31-10-2020	Saturday	Naraka Chathurdashi			
in. i	M.	14-11-2020	Manday	Balipadyami, Deepawali			
is in	10.	16-11-2020	Thursday	Kanakadasa Jayanthi			
	19.	03-12-2020	Eviday	Christmas			
	This Mahanavi 26-04-203 If a nodified sutomatic	a list does not mi/Ayudha Po 20, 30-08-2020 ny of the Holis by notification cally applicable	include Rep oja and Kan , 25-10-2020 days for the of the Cow	ublic Day, Basava Jayanthi, Last Day of Monifa nada Rajyotsava falling on Sundays on 25-01-202 and 01-11-2020 respectively. festivals of Muslim fraternity notified above sta ernment of Karnataka, such notification shall			
	i longi	and Leave or E	armed Leave	shall not be sanctioned for prefixing or suffixing			
	Can any In	terrening work	ing days in co	ombination with holidays,			
	or any m	Are serving when	Construction of the other	st.			
				SNVL. MARASIMHA RAJU PRESIDENT			
deres 1	To .		19000 100	an in the second			
and the	All the He	cads of The Oxi	ord Education	nal Institutions.			

Figure 3-7: List of Holidays-2020

The list of holidays for the year 2021 is shown in figure 3-8.



If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays

> SNVL NARASIMHA RAJU PRESIDENT

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Figure 3-8: List of Holidays-2021

### 3.2.6.2. Tentative Schedule of College

The tentative schedule of the college is 09.00 AM to 4:15 PM.

The library timing is 09:00 AM to 10:00 PM.

The details of the class sessions are given in table 3-2.

S. No.	Session	Timings		
1	1 <sup>st</sup> Hour	09:00 TO 9:55AM		
2	2 <sup>nd</sup> Hour	09:55 TO 10:50 AM		
3	Short Break	10:50 TO 11:00 AM		
4	3 <sup>rd</sup> Hour	11:00 TO 11:55 AM		
5	4 <sup>th</sup> Hour	11:55 TO 12:50 PM		
6	Lunch	12:50 TO 01:30 PM		
7	5 <sup>th</sup> Hour	1:30 TO 2:25 PM		
9	6 <sup>th</sup> Hour	2:25 TO 3:20 PM		
10	7 <sup>th</sup> Hour	3:20 TO 4:15 PM		

#### Table 3-2: Tentative College Schedule

#### 3.2.6.3. Staff and Students of College:

The number of staff including teaching, non-teaching, and house-keeping is given in the table 3-3. The number of students includes both boys and girls.

S. No.	Year	Teaching Staff	Non- Teaching staff	Total Staff	Total Students
1	2017	303	122	425	3572
2	2018	285	95	380	3044
3	2019	269	92	361	3124
4	2020	240	68	308	2728
5	2021	222	57	279	2722

#### Table 3-3: Number of staff and students

Quality Audit Report of The Oxford College of Engineering, Bengaluru

# 4. GREEN CAMPUS MANAGEMENT AUDIT

## 4.1. Facility Description

The Oxford College of Engineering maintain a green and clean campus, planting trees under the initiative of NSS are the strides towards the environment.

The students and faculty are encouraged to adopt cleanliness, making the campus garbage and plastic free zone. Tree plantation programs help in encouraging eco-friendly environment, which provides pure oxygen within the institute.

The maintenance team takes care of the up-keeping of the environment and ensures to keep the surroundings clean. They maintain all the plantations by employing the cleanliness and watering regularly.

There are more than 50 trees and well-maintained landscaping of lawns and plantations.

## 4.1.1. Landscaping with Trees and Plants

Landscaping of the college is worth seeing and reflects aesthetic sense. The institute has a canopy of trees and plants to make the environment pollution free to safeguard the health of all the inmates. The trees provide shade and beautiful ambience. Utmost care is taken to develop and maintain green landscaping by trained gardeners and supervisor. The construction and maintenance team constituted in the college looks after the development and maintenance of the greenery in the campus. Photos taken during the audit are shown in figures 4-1 to 4-20.



Figure 4-1: Trees in front of new block - Picture 1



Figure 4-2: Trees in front of new block - Picture 2



Figure 4-3: Trees in front of new block - Picture 3



Figure 4-4: Plantations around new block - Picture 1



Figure 4-5: Plantations around new block - Picture 2



Figure 4-6: Plantations around new block - Picture 3



Figure 4-7: Plantations around new block - Picture 4



Figure 4-8: Trees near engineering old block - Picture 1



Figure 4-9: Trees near engineering old block - Picture 2



Figure 4-10: Trees near engineering old block - Picture 3



Figure 4-11: Plantations near STP collection tank - Picture 1



Figure 4-12: Plantations near STP area - Picture 2



Figure 4-13: Plantations near STP area - Picture 3



Figure 4-14: Plantations near STP area - Picture 4



Figure 4-15: Cafeteria Entrance



Figure 4-16: Trees near hostel block



Figure 4-17: Trees behind hostel block



Figure 4-18: Tree near workshop area- Picture 1



Figure 4-19: Tree near workshop area- Picture 2



Figure 4-20: Tree near workshop area- Picture 3

# 4.2. Best Practices Implemented for Green Campus Management

The maintenance staff members do periodic checks and maintain records for the same. Many initiatives are taken by the management to inculcate the eco-friendly culture among the student community. The green campus provides the facilities such as rain water harvesting, well grown trees, plantations and lawn all around the campus.

- Plastic free campus
- Green landscaping with trees, plants like vegetable, fruits and medicinal plants; lawns
- Paperless office: All communication regarding academics and administration are sent as e-mails and messages to faculty members and students that contributes paperless communication
- Apart from above, the maintenance of entire campus gardening is done regularly.

Environmental conscious administration, the management and the students of the college look after the environment carefully. Every year, during rainy season, tree plantation and carefully look after it. It's our own responsibility to preserve the work done on the campus related to the environment.

## 4.2.1. Purchase of gardening tools

To maintain the gardens, suitable gardening tools are required. Purchase of gardening tools are done whenever it is required.



The sample bill for purchase of gardening tools is shown in figure 4-21.

Figure 4-21: Sample bill -Purchase of gardening tools

## 4.2.2. Regular maintenance of greeneries

The greeneries within the campus are maintained properly with dedicated garden maintenance staff. They do proper maintenance like weeding, lawn care and watering etc., The sample image of garden maintenance is shown in figure 4-22.



Figure 4-22: Garden maintenance activity

The sample image of payment made for gardening work during the year 2020 is shown in figure 4-23.



Figure 4-23: Sample payment voucher for gardening work - 2020

The sample image of payment made for gardening work during the year 2021 is shown in figure 4-24.

OZFORD 101114 Bengaluru, Karnataka, India 82, Hosur Rd, Sarvebhavi Palya, Gengahau alpha 550068, India Let 12.993994\* Long 77/036674 104/02 04/10 PM

Figure 4-24: Sample payment voucher for gardening work - 2021

## 4.2.3. Dedicated watering system

The treated STP water is used for watering the trees and garden. For this purpose, dedicated pipeline is provided. Taps are provided at various locations to facilitate the watering of garden.

The tap near STP area for providing STP treated water to garden is shown in figure 4-25.



Figure 4-25: STP treated water tap for garden use- near STP area

The tap near engineering new block for providing STP treated water to garden is shown in figure 4-26.



Figure 4-26: STP treated water tap for garden use- near engineering new block

The tap near engineering old block for providing STP treated water to garden is shown in figure 4-27.



Figure 4-27: STP treated water tap for garden use- near engineering old block

## 4.2.4. Maintenance team

The college has a dedicated maintenance team for maintaining the greeneries. The perform maintenance activities such as cutting the grass, emptying bins, managing weed control, leaf raking, watering the greeneries etc.,

The list of gardeners is given in table 4-1.

S. No.	Name of the gardener
1	Mr. Savakayyal
2	Mr. Nagappa
3	Mr. Chennanarayannappa
4	Mr. Krishnappa

Table 4-1: List of gardeners

# 4.2.5. Awareness programs

## Save the Earth by Plantation:

The Oxford College of Engineering, NSS students organized a program called 'Save the Earth by Plantation' on 10-10-2016. The topic discussed during the event is 'how to save the earth by green plantation'. Plantation were also made during the program.

The plantation activity during the event is shown in figure 4-28.



Figure 4-28: Save the Earth by Plantation - 2016

### Tree Plantation under Green India - Clean India:

A Tree Plantation Drive under the Green India- Clean India was organized by NSS unit of The Oxford College of Engineering with MBA students in The Oxford college of Business management, HSR Layout, Bangalore on 04.01.2017. The drive was inaugurated by Shri SNVL Narasimha Raju Chairman and he elucidated the significance of a cleansurroundings to the students.

With a drive to create responsiveness among the students about the need of the green in the environment and the importance of trees in our nature, The program was organized. 110 Students with 15 faculty members and Principal planted saplings.

The image of tree plantation during the drive is shown in figure 4-29.



Figure 4-29: Tree plantation under Green India - Clean India -2017

## The Special Camping Programme:

During the one-week special campaign programme by NSS students, the participants were assigned with task to clean the identified areas in the Thattanahalli village on 25.11.2018. NSS students with the help of Villagers, identified appropriate place for plantation of Herbal Drug plants and involved in the same. 50 NSS participants, 2 faculty members and few villagers have joined in this programme.

The sample image taken during plantation of herbal plants is shown in figure 4-30.



Figure 4-30: Plantation of Herbal Drug plants-2018
#### One Student One Tree -Plantation drive:

NSS Unit of The Oxford College of Engineering had conducted plantation drive in Begur Road as per the direction of Hon'ble HRD Minister Ramesh Pokriyal Nishank on **10<sup>th</sup> July 2019**. This program was launched a new campaign **"One Student One Tree"** in line with the Hon'ble Prime Minister Narendra Modi's idea of a green and healthy environment.

The Awareness Program was conducted in association with BrahmaKumaris Foundation by Ms B K Megha Deep, who was the speaker for the same. There were 100 students participated with 5 Faculty members in this event.

It was very informative Awareness session especially for the Students of our College. Director, Principal and the students were planted the saplings in our campus.



The sample image taken during the drive is shown in figure 4-31.

Figure 4-31: Plantation Drive-One Student One Tree-2019

#### **Plantation of Trees:**

An outreach program of "**Plantation of Trees**" was organized by Department of Electronics and Communication with the faculty coordinator Prof. Mohanthi K for 2<sup>nd</sup> semester students on **13<sup>th</sup> of July, 2021** at Ambalipura lake premises Bangalore.

The main aim of this program was to create an awareness of the importance of trees in our daily lives. The program successfully managed to bring the awareness of the effects of lack of tress and the importance of planting more trees. This program encouraged our students and the local residents to plant more trees in their locality and help balance the eco-system.

The invitation of the program is shown in figure 4-32.



Figure 4-32: Plantation of Trees - Invitation

The plantation of mango tree during the program is shown in figure 4-33.



Figure 4-33: Plantation of Mango tree - 2021

### 4.3. Recommendations on Green Campus Management

- Encouraging students to recommend creative ideas for making campus more greenery.
- Conducting competition among departments to promote student's ideas in sustainability initiatives.
- Indoor plantations and pot plantations in the corridors are recommended.

### 5. ANNEXURES

### 5.1. Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

### 5.1.1. General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

#### 1. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 5-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	Ι				
2	II				
3	III				

#### Table 5-1: NAAC grading's Table

#### 2. Internal Quality Audit Team: 2020 – 2021

Table 5-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

#### Table 5-2: Internal Quality Audit team

#### 3. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 5-3.

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S. No.	Description	Details	
1.	Name of the		
	College and		
	address:		
1.a	Head office		
	address :		
2.	Telephone/Fax		
	No		
3.	Co-ordinating	Name:	<u>^</u>
	officer:	Mob:	
		Email:	
4.	Year of		
	Establishment:		
5.	Hostel		
	(Available/Not		
	Available)		
6.	No. of Working		
	days/year		
7.	Brief description		
	of Campus		

#### Table 5-3: General information of the college

#### 4. College Infrastructure

Infrastructure details of the college were gathered from table 5-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

#### Table 5-4: Detail Infrastructure of the college

- 5. Details of Student clubs
- 6. Details of cells that support students
- 7. Tentative Schedule of a working day:
- a. No. of working days per year:
- b. List of holidays:
- 8. Total area of the campus
- 9. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 5-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

#### Table 5-5: Details of the departments

#### 10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 5-6

	Teaching Staff	Non-teaching	Support Staff (Security,
S. No.		Staff	House Keeping)

65

Male	Female	Male	Female	Male	Female

#### Table 5-6: Details of the Staff

#### 11. Number of Students

Number of students is collected from table 5-7.

S. No.	Boys	Girls
1		

#### Table 5-7: Details of the Students

#### 12. Additional infrastructure details have been collected from table 5-8.

S. No.	Description	Details
1.	Number of blocks available for boys hostel	Nos.
2.	Number of rooms available for boys hostel	Nos.
3.	Number of blocks available for girls hostel	Nos.
4.	Number of rooms available for girls hostel	Nos.
5.	Whether Laundry is available in the hostel	Yes / No
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron )	
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No
9.	Whether lifts available in academic block	Yes / No
10.	Whether Kitchen is available in the academic block	Yes / No
11.	Whether any food counter (outside caterers) available in academic block	Yes / No

12.	Whether any commercial shops available in	Yes / No	
	academic block		
13.	Any more information or additional details of		
	academic block you would like to share -		
	kindly elaborate here		

#### Table 5-8: Details of the departments

#### 5.1.2. Water Audit details:

#### 1. General information

General information required for water management analysis is collected from table 5-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	

S. No.	Description	Details
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well	
	water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

#### Table 5-9: Water management details

#### 2. STP information

STP details are collected from table 5-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

#### Table 5-10: Details of STP

#### 3. RO Plant information

RO Plant details are obtained from table 5-11.

S. No.	Location	Quantity	Capacity
1.			
2.			

3.	
----	--

Table 5-11: Details of RO Plant

#### 5.1.3. Energy consumption details:

#### 1. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 5-12.

S. No.	Туре	Units		Value	Cost in Rs.
1	Electricity	kWh	2019		
			2020		
2	LPG	Cylinders	<u>.</u>		<u>.</u>
3	Diesel	Litres (Mont	h wise		
		consumption	for		
		the last two y	ears)		
4	Others resources				
	(Please specify)				
5	Total connected load	kW			
6	Contract demand	kVA			
7	Maximum demand	kVA			
	recorded				
8	Average power factor				
9	Energy charges	Rs./kWh			
10	Demand charges	Rs./kVA			
	* Attach Electricity B	ill Copy of la	st 2 yea	rs	

#### Table 5-12: Details of Energy consumption

#### 2. Solar Energy details:

The solar energy details required are collected from table 5-13.

S.	Buildin	Solar water Heater			Solar PV System		
No	g No./	Capacit	Workin	Year of	Capacit	Workin	Year of
•	Name	у	g / Not	Installatio	у	g / Not	Installatio
			working	n		working	n

2				

#### Table 5-13: Details of Solar Energy

- 3. Solar Street lights details:
- a. Quantity -
- b. Capacity -
- c. Year of Installation -

#### 4. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 5-14.

S. No.	Description	Details
1.	Number of Transformers Installed	Nos.
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No
4	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No
8	Whether Air Conditioning Units have been installed in the campus	Yes / No
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.
10.	Total number of computers available in the campus	Nos.
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.
12.	Whether water coolers are installed in the academic blocks	Yes/No

S. No.	Description	Detai	ils
13.	Type of lamps (Fluorescent Tube Light, CFL, LED,	Nos.	
	Incandescent, Sodium / Mercury lamps, etc.,)		
	installed in the campus		
14.	Type of fans (ceiling, wall mount, standing, exhaust,	Nos.	
	etc.,) installed in the campus		
15.	Whether exhaust fans are installed in hostel /	Yes /No	
	kitchen.(If Yes, share the quantity and installed		
	location)		
16.	Any other electrical equipment's in college buildings.		

### Table 5-14: Details of Electrical Equipment

- 5. List of energy saving initiatives implemented
- 6. List of energy saving initiatives in plan for future

#### 5.1.4. Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

#### 1. Basic information

Basic information for waste management is collected from table 5-15.

S. No.	Description	Yes/ No
1	Whether wet and dry garbage segregation is done inside the	
	campus:	
2	Whether garbage is given to external agencies / municipal agencies?	

#### Table 5-15: Basic details of waste management

#### 2. Types of Waste generated

Types of waste generated in the college are obtained from table 5-16.

S. No.	Description	Yes /	Remarks
		No	
1	E-Waste (Computers, electrical and electronic parts)		
2	Hazardous / Chemical Waste		
3	Solid Waste (Damaged furniture, paper waste, paper plates)		
4	Dry Leaves		
5	Food Waste		
6	Waste Water (Washing, urinals, bathrooms)		
7	Glass Waste (Broken glass wares from the labs)		
8	Unused Materials		
9	Plastic Waste (Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc.)		

#### Table 5-16: Types of waste generated

#### 3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 5-17.

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S. No.	Location	Bio- degradable	Non- Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

#### Table 5-17: Segregation of waste

#### 4. Waste generation management

Waste generation management of the college was collected from table 5-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

#### Table 5-18: Waste Disposal methods

#### 5.1.5. Green campus management details:

#### 1. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 5-19

S. No	Description	Details
1	Total number of plant species identified	
2	Total number of plants on the campus	
3	Total number of Trees on the campus	
4	Garden area inside the college –	
5	Total number of medicinal plants /trees on the campus	
6	Total number of vegetables and fruits plantation in the	
	campus	
7	Whether display boards are given to plants and trees for	
	identification	

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8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

#### Table 5-19: List of plantation details

#### 2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 5-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 5-20: List of plants/trees in campus

### 5.1.6. Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 5-21.

S. No	Description	Details
1	Whether college provides transport facility for staff and students (Yes/No)	
2	Number (or Percentage) of staff using transport services provided by college	
3	Number (or Percentage) of students using transport services provided by college	
4	Number (or Percentage) of Staff using public transport	
5	Number (or Percentage) of Staff using Bike	
6	Number (or Percentage) of Staff using Car	
7	Number (or Percentage) of students using Public transport	
8	Number (or Percentage) of students using Car	
9	Number (or Percentage) of students using Bike	
10	Number (or Percentage) of students using Bicycles	
11	Average consumption of diesel per month	
12	Average electricity consumption per month	
13	Average LPG consumption per month	

#### Table 5-21: Details of Carbon footprint management

### 5.1.7. Photos required for Audit:

#### 1. General Photos

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 5-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

6	Photos of any other policies adopted by college	
	Photos	Drinking Water
		STP processed water
7	test	Bore-well water
	report	Other water Sources (Like Tanker water and any
		other)
8	Photos of use of Energy efficient devices like fan, bulbs etc.	
9	Photos of LCD/LED monitors used in Labs	
10	Photos of dry and wet waste collection bins	
11	Photos of celebrating World Environment Day	
12	Photos of celebrating World Water Day	
13	Photos of celebrating World Earth Day	
14	Photos of celebrating World Ozone Day	

Table 5-22: List of photos

# **QUALITY AUDIT REPORT**

## ON

# **ENERGY AUDIT**

OF

THE OXFORD COLLEGE OF ENGINEERING 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068 2016 - 17 TO 2020 - 21



ENHANCING RESOURCE EFFICIENCY

## **QUALITY AUDIT REPORT**

## OF

# 'THE OXFORD COLLEGE OF ENGINEERING'

### 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



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Chairman – The Oxford Educational Institutions

The Oxford College of Engineering

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## DISCLAIMER

The Audit Team has prepared this report for The Oxford College of Engineering, Bengaluru based on the input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

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

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

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# **ABBREVIATION AND ACRONYMS**

1.	А	:	Amperes
2.	AC	:	Air Conditioner
3.	APFC	:	Automatic Power Factor Controller
4.	AMF	:	Automatic Mains Failure
5.	BBMP	:	Bruhat Bengaluru Mahanagara Palike
6.	BESCOM	:	Bangalore Electricity Supply Company
7.	BWSSB	:	Bangalore Water Supply and Sewerage Board
8.	CC Camera	:	Closed Circuit Camera
9.	DG	:	Diesel Generators
10.	EE Fan	:	Energy Efficient Fan
11.	E-Waste	:	Electronic Waste
12.	FTL	:	Fluorescent Tube Light
13.	GHG	:	Green House Gas
14.	Hz	:	Hertz
15.	HP	:	Horse Power
16.	ΗT	:	High Tension
17.	Ι	:	Current
18.	ICT	:	Information and Communications Technology
19.	IQAC	:	Internal Quality Assurance Cell
20.	ISO	:	International Organization for Standardization
21.	kgs	:	Kilograms
22.	kL	:	Kilo Liters
23.	kV	:	kilo volt
24.	kVA	:	kilo volt ampere
25.	kVAr	:	Reactive kilo volt ampere
26.	kW	:	Kilo Watt
27.	kWh	:	kilo Watt hour
28.	kWp	:	kilo Watt peak
29.	LCD	:	Liquid Crystal Display
30.	LED	:	Light Emitting Diode
31.	LT	:	Low Tension
32.	mA	:	Milli Amperes
33.	MoU	:	Memorandum of Understanding
34.	NA	:	Not Applicable
35.	NAAC	:	National Assessment and Accreditation Council
36.	NSS	:	National Service Scheme
37.	OHT	:	Over Head Tank
38.	Prim/Sec	:	Primary/Secondary
39.	PF	:	Power factor
40.	Ph.D.	:	Doctor of Philosophy

41.	PV	:	Photo Voltaic
42.	RCC	:	Reinforced Cement Concrete
43.	RO	:	Reverse Osmosis
44.	RR. No.	:	Revenue Register Number.
45.	Sq. Ft.	:	Square Feet
46.	Sq.m.	:	Square Meter
47.	SRTPV	:	Solar Roof Top Photo Voltaic
48.	TL	:	Tube Light
49.	TR	:	Ton of Refrigeration
50.	ΤV	:	Television
51.	V	:	Volts
52.	W	:	Watts
53.	Wi-Fi	:	Wireless Fidelity
54.	Wp	:	Watt peak
55.	#	:	Number

### **1. INTRODUCTION**

The Oxford College of Engineering was started in the year 2000, is one of the most prestigious institutions in Bengaluru that provides quality teaching and training in professional UG courses in 10 streams of Engineering in, Computer Science, AIML, Electronics and Communication, Electrical and Electronics, Mechanical, Civil, Bio-Technology, Mechatronics & Automobile. College also offers 10 Postgraduate programs in Technology (M. Tech), Computer Application (MCA) and Business Administration (MBA), and 11 Research centers recognized by VTU to offer Ph.D. programs. College is affiliated with the Visvesvaraya Technological University (VTU) and approved by the All-India Council for Technical Education (AICTE). The college also has been accredited by the NBA, and IAO quality-assessed organizations. The Institute name is also included in the NIRF & AICTE CII Survey of Industry Linked Technical Institute- 2020. Institution is categorized in Band promising in ARIIA ranking in the year 2021. The college is set in a sprawling 11.5 acres campus in the prestigious IT corridor, ideal for education in a serene environment with over 85,000 square meters of built-up area spread over 2 blocks, with enormous investment for academic purposes. The college has well equipped with state-ofthe-art infrastructure facilities to carry out various real-time projects, research, and consultancy activities in recent technologies. All the Departments have undertaken many research/consultancy projects funded both by multinationals and government agencies. The college has a good number of research publications in various reputed journals and patents. College has a good number of R&D projects sponsored by AICTE, VGST, VTU, IEEE, ICMR BRNS, NIF, NRB(DRDO) & BIRAC. It has a history of excellent placement track record in various multinational companies' offers with high salary packages.

#### VISION

To develop competent students with good value systems and face challenges of the continuously changing world.

#### MISSION

To be respected and most sought-after engineering educational institutions engaged in equipping individuals capable of building learning organizations in the new millennium.

#### **QUALITY POLICY**

To equip the students with highest standard of education, knowledge and ethics. To prepare them to meet the challenges of life with full confidence. Aim at all round development of the personality to be useful citizens.

#### Campus Area and Built-up area

The area of the campus (built up and total) area is given in table 1-1.

S. No.	Description	Units	Details
1	Engineering Campus total area	Acres	11.5
2	Built up area	Sq. mt.	85,000

#### Table 1-1: College Area

#### **Committee and Cells**

The Oxford College of Engineering (TOCE) has various functional committees and cells. They are listed below:

- VTU/AICTE Committee
- o Planning & Accreditation Committee
- Library Committee
- Research and Development Committee
- Training & Placement Committee
- o Faculty Development Committee
- o Purchase & Budget Committee
- o College Magazine/Calendar /Newsletter Committee
- o Professional Societies / Chapters
- o Cultural Association
- o Alumni Association
- o Sports Committee
- o NSS
- o Students Grievances Redressal Committee
- o Discipline Committee
- o Women's Grievance Redressal Committee
- o Anti-sexual Harassment Committee
- o Entrepreneurship & Incubation cell
- o Anti-Ragging Committee
- o Website, Server & Internet Committee
- o Public Relation Committee
- o Hostel & Canteen Committee
- o Prevention of Caste Based Discrimination Cell
- o College Internal Complaints Committee
- o Internal Task Force Team COVID 19 Coordination Committee
- o Internal Quality Assurance Cell (IQAC)
- o Exam Cell
- o Disability Recourse Centre
- o IPR Cell
- o IA Answer Scripts Evaluation Review Committee
- o IA Question Paper Scrutiny Committee

## Internal Quality Assurance Cell (IQAC)

The college management constitutes the Internal Quality Assurance Cell including Principal, teaching faculty, non-teaching faculty, UG students (Male & Female), PG students (Male & Female), alumni, parent and industry representatives every year.

The list of Internal Quality Assurance Cell members for the academic year 2016-2017 is shown in figure 1-1.



Figure 1-1: List of IQAC members 2016-2017

Quality Audit Report of The Oxford College of Engineering, Bengaluru

The list of Internal Quality Assurance Cell members for the academic year 2017-2018 is shown in figure 1-2.



Figure 1-2: List of IQAC members 2017-2018

The list of Internal Quality Assurance Cell members for the academic year 2018-2019 is shown in figure 1-3.



Figure 1-3: List of IQAC members 2018-2019

The list of Internal Quality Assurance Cell members for the academic year 2019-2020 is shown in figure 1-4.

Estd.	1st Phas THE THE Approved by	CHILDHEN'S EDUCATION Administrative e., J.P. Nagar, Bengaluru - 500 078. 42 : OXFORD COLLEG cognized by the Coxt. of Kamerina, Athlated to Vin A 1.C.T.E., New Delts, Accenduled by NAC A NEW Bornmanshalli, Hosur Boad, (2): 000 61754001 / 002 / 00 E-mail: engprincipal @theoxid.ed	N BOGIETY (Regit) Officer : 080 - 61754501 - 502 Fau: 080 2654 EOFENGINEERI vertamys Technological University, Belagavi A Nee Defit and Nocoptant by UGC under te Bengaluru - 500 068. 4 Fau: 060 25730551 N Web: www.theoxdord.edu	
	Pro- By the direction of the Go Assurance Cell (IQAC) for activities of the cell once Governing body. These or	ceedings of the Principal and Chairpen Order werning body, undersigned is pleased i The Oxford College of Engineering; the In three months, minimum four timi ders will come in to force from the day does not found Following is the const	Date: 27/07/2019 to reconstitute Internal Quality e cell shall report the work and es In an academic year to the of Issue of orders and they will itution of IQAC	
	be on same until further o	Designation	Role	
No	Name of Member	Principal	Chairperson	
2.	Dr. Malleshalah.T.S	Head, Dept. of Civil Eng.	Member - Teaching Faculty Representative Member - Non Teaching Faculty Representative Member - UG Female Student	
3.	Mrs.Uma	Office Staff		
4.	Ms.Ashmitha Dale Pals	CSE Student	Representative	
5.	Mr.VishalNadig	EEE Student	Member – UG Male Student Representative	
6.	Ms.Dechekka K U	MBA Student	Member – PG Female Student Representative	
7.	Mr.Manoj P	MCA Student	Member – PG Male Student member Representative	
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative	
9.	Mr.C.Prakash Mr.B.R.MHemaMaheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative	
10. Mr.Shamin Dudu		General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative	
11.	Dr. Shashidhar	Professor & Head MCA	Member - Coordinator	
12.	Prof.Devi Vighneshwari	Asst. Prof in EEE	Principal & Chairperson IQAC	
	Copy to: 1. Chairmanand Vice Ch 2. Committee Members 3. All the HOD's	airman	De Ozferd College of Enginéering Bermanshalls, Hosur Road Bengaluru-560 068.	

Figure 1-4: List of IQAC members 2019-2020

The list of Internal Quality Assurance Cell members for the academic year 2020-2021 is shown in figure 1-5.



Figure 1-5: List of IQAC members 2020-2021

### **Overview of Quality Audit:**

Quality Audit helps college / facility to:

- Understand the usage of electricity, water and other natural resources
- Identify opportunities to conserve various natural resources
- Identify various technological improvements
- Evaluate the techno-commercial of identified conservative measures
- Create awareness among the students and staff
- Disseminate the commitment of management towards saving nature
- Develop a culture among students, staff and management to be socially responsible

# 2. PRE – AUDIT PHASE

A Pre-audit meeting is a prerequisite for the audit, it helps to meet and discuss about the schedule and documents required during the audit. The pre-audit meeting was conducted at The Oxford College of Engineering. During the meeting, introduction of team members, scope and objectives of the audit were discussed.

#### Management Commitment

The Management of the college has shown great commitment towards Quality Audit during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the Quality Auditing.

College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

### Scope and Goals of Quality Auditing

A clean and healthy environment aids effective learning and provides conducive learning environment. There are various efforts around the world to address environmental education issues. Quality auditing is one among them for educational institutions.

Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects.

This data will also provide a basis for calculating the economic benefits of resource conservation projects, by establishing the current rates of resource use and their associated costs. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self-audits.

# 3. **ON-SITE AUDIT PHASE**

# 3.1. Scope / Target Areas of Quality Auditing

## 3.1.1. Water Audit

Water Audit addresses water consumption, water sources, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

## 3.1.2. Energy Audit

Energy Audit addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability.

## 3.1.3. Waste Management Audit

Waste Audit addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

## 3.1.4. Green Campus Management Audit

Green campus initiatives are becoming an integral part of modern day's university systems. Green campus Audit helps in maintaining the air and water clean. It regulates the climatic conditions and provides a healthy and comfortable environment for living.

## 3.1.5. Environment Footprint Audit

Environment Footprint Audit addresses the usage of fossil fuels (coal, diesel, petrol and gas). The mode of commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels.

# 3.2. Audit Methodology and Approach

The methodology and approach adopted for the study involve various steps that include:

- Review of Document and records
- Review of Policies
- Review of MoU
- Review of various measures implemented
- Site Walkthrough
- Data Collection
- Interviews

## 3.2.1. Review of Document and Records

The various documents and records such as:

- o Electricity bills
- Water bills
- Equipment registers
- List of appliances
- o Internal Quality Audit document
- o Purchase document
- Cash payment receipts
- o Equipment service report
- o Maintenance and service payment receipts

were reviewed and, relevant data and inputs required for analysis have been collected.

## 3.2.2. Review of Policies

College has various policies that include safety policy and Anti-ragging policy.

### A. Safety Policy:

All the students, teaching staff, non-teaching staff, maintenance and house-keeping staff have been given training to use fire extinguishers in emergency situations of fire and explosion. Fire hydrant system is available at the campus. Also, fire extinguishing cylinders have been installed in each floor and in laboratory areas. Fire order statements and use of fire extinguisher has been posted at each block. Fire alarm is also installed at the premises. Photos of fire order and fire alarm are shown in figure 3-1 and 3-2.





Quality Audit Report of The Oxford College of Engineering, Bengaluru



Figure 3-2: Fire alarm panel at engineering old block

## B. Anti-Ragging policy:

Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, hostel, sports, canteen, etc.) whether located within the campus or outside and in all means of transportation of students whether public or private. **'Say No to Ragging'** poster is placed in each block of the campus and a sample photo is as shown in the figure 3-3.



Figure 3-3: Anti-ragging poster

## 3.2.3. Review of various measures implemented

During the Quality Audit study, it was observed the college has taken various initiatives in conserving natural resources that include:

- Internal Quality Assurance Cell including Staff, Students, Alumni, parents and industrial members.
- Installation of Solar Roof Top Photo Voltaic (SRTPV) system for power generation.
- Wheeling to grid is done.
- Installation of LED fixtures to reduce electricity consumption
- Installation of LCD/LED monitors for all the desktops to conserve electricity
- Switching OFF lights and fans whenever not in use to save electricity
- Installation of RO plant to provide purified drinking water.
- Dual water piping system for washrooms and toilets, to use STP treated water for flushing
- Sewage treatment and using the treated final water for toilet flushing, gardening and cleaning purposes
- Rain water harvesting system is available in the campus.
- Regular testing of STP treated water quality parameters
- Dedicated watering system for greeneries.
- The use of sign boards in all the wash rooms were observed, to create awareness for water conservation
- Installation of waste segregation bins at all the rooms to separate the dry and wet waste
- Maintenance of logbooks and registers is done properly.
- Training is conducted on regular basis regarding usage of fire extinguisher, conservation of resources such as electricity, water, food and green campus.
- Maintenance team is available for electrical, plumbing, waste management and green campus management.

## 3.2.4. Site walk through

Site walk through was conducted with staff members, students and audit team members. Staff and students have shown very keen interest in the data collection process and methods to be followed in field data collection. The staff and students have given inputs and suggestions for resource conservation as well.

### **College Infrastructure**

The Oxford College of Engineering campus has various blocks and departments. Each floor has state of the art class rooms, staff rooms, laboratories, libraries and many more. Details of infrastructure are as follows:

- 0 Inhouse hostel for boys and girls
- o Bank facility
- o 24 hrs. atm in the campus
- o Solar plant
- o Rain water harvesting
- o RO water facility
- 0 Lifts & ramps
- o Cafeteria
- o Gymnasium
- o Cricket stadium / basketball court / badminton court
- Wi-Fi facility in the campus
- o CCTV security
- Telephone and fax facility
- o Photocopying facility
- The oxford enterprises (stationery)
- 0 Library

- 0 Digital library
- o Extended library hours
- o Hospital facility
- o Free dental treatment
- First aid, medical and counseling facility
- 0 Scholarships
- o Group insurance
- 0 Placements
- o Placements training
- o English language coaching
- o Add-on courses
- o Cloud based ERP for students
- 0 Transport
- Parking facility
- o Cultural activities center
- o Incubation Centre for research activity
- o Staff room
- o Smart class rooms
- o Conference room
- o Student common room
- o Green campus

## 3.2.5. Inventory Collection

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, computers, projectors, printers, scanners etc., The consolidated list of inventories is given in table 3-1.

	Dept	Flore Tube	scent Light	LE	D	CFL	Fa	n	Cor	nputer	Exha		<b>D</b> · · ·	Xer	сс	тν	<b>.</b> .		
S. No.		40 <del>V</del>	MOR (36₩)	18₩ Tub e	12 ₩		Ceiling Fan	∀all moun t Fan	LED /LCD Monito	CRT Monitors	ust Fans	ocan ners	ers	ox Mac hine	Came ra	Scre en	Proje ctor	AC	Refridg erator
1	AUTO ENGG	64	0	12	0	0	26	6	5	0	0	1	2	0	0	0	1	0	
2	BT	86	0	0	0	0	42	0	10	9	2	2	2	2	8	0	1	2	4
3	Chemistry	0	0	17	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
4	CSE	52	0	141	0	0	59	13	3	218	0	0	0	4	0	12	0	5	1
5	Civil	52	0	16	0	0	56	4	30	0	0	1	3	0	0	0	0	0	
6	ECE	81	0	0	0	0	44	11	48	0	3	0	4	0	7	0	3	1	
7	EEE	48	2	0	6	0	54	2	41	0	0	0	2	0	7	0	1	0	0
8	ISE	34	0	77	0	0	29	5	128	0	0	0	2	0	0	0	1	0	
9	Library	0	45	0	0	0	53	0	30	0	0	1	1	0	0	0	0	0	
10	Maths	16	0	0	0	0	14	1	5	0	0	0	7	0	0	0	0	0	
11	MBA	39	0	0	0	96	42	0	16	0	0	0	2	0	0	0	3	3	
12	MCA	51	0	0	0	0	31	0	242	0	0	0	2	0	3	0	0	9	
13	MECH	89	0	0	0	0	59	0	84	0	2	0	2	0	5	2	3	0	
14	MTE	24	0	0	0	0	19	0	3	0	0	0	1	0	4	0	1	0	
15	PHYSICS	39	0	0	0	0	27	1	2	0	0	0	1	0	6	0	0	0	
Tot	al (College)	675	47	263	6	96	567	43	647	227	7	5	31	6	40	14	14	20	5
To	tal(Hostel)	413	0	71	0	0	431	0	1	0	0	0	1	0	0	0	0	0	0
Tot	tal (Overall)	1088	47	334	6	96	998	43	648	227	7	5	32	6	40	14	14	20	5

Table 3-1: Consolidated list of inventories

## 3.2.6. Interviews

To collect the various data, information and operating patterns, interviews were conducted with college staff (Principal, teaching staff, non-teaching staff) and students. The consolidated information from the interviews is given in the following sub-sections.

#### 3.2.6.1. List of Holidays:

The lists of holidays were collected during the study and the same is given below. The list of holidays for the year 2017 is shown in figure 3-4.

	THE C.A. SI D: 3	CHILDREN'S OXFORD E te No. 40, 30 <sup>th</sup> Mi (Recognize 0410501/502, Fax	EDUCATION SOCIETY (Regd.) (Regn.No. 284/74-75) DUCATIONAL INSTITUTIONS sin, 1 <sup>st</sup> Phase, J.P. Nagar, Bangalore -560 078. d by Government of Karnataka) :: 30410569 E-mail: info@theoxford.edu	
No.: C	ES/PAYROLL/	01/2016-17	Date: 06-01-2017	
		NO	TIFICATION	
	Sub: Gener	al Holidays de	clared by the Government of Karnataka	
	for th	e Calendar Ye	ar 2017.	
Karna Educa	The following i taka for the C tional Institution	s the list of h Calendar Year ons also.	olidays declared by the Government of 2017 as applicable for all The Oxford	
SI.No	Date	Day	Occasion	
1.	14-01-2017	Saturday	Uttarayana Punya Kala Sankranti Festival	
2.	2. 26-01-2017 Thursday Republic Day			
3.	24-02-2017	Friday	Maha Shivaratri	
4.	29-03-2017	Wednesday	Chandramana Ugadi	
5.	14-04-2017	Friday	Good Friday & Dr. B.R.Ambedkar Javanthi	
6	29-04-2017	Basaya Jayanthi		
0.	01.05.2017	May Day		
f.	01-05-2017	Kutub-E-Ramzan		
0.	15 08 2017	Tuesday	Independence day	
9.	13-08-2017	Priday	Varasiddhi Vinayaka Vrata	
10.	23-08-2017	Caturday	Bakrid	
11.	02-09-2017	Duerday	Mahalaya Amayasye	
12.	19-09-2017	Maha Navami Avudapooia		
13.	29-09-2017	Privaty	Vijavadasami	
14.	30-09-2017	Monday	Gandhi Jayanthi	
15.	02-10-2017	Thursday	Maharshi Valmiki Javanthi	
10.	18:10.2017	Wednesday	Naraka Chaturdashi	
17.	18-10-2017	Belden	Ralioaduami Deenavali	
18.	20-10-2017	Wednesday	Kenneda Raivothsava	
19.	01-11-2017	Mender	Kanakadasa Jayanthi	
20.	00-11-2017	Delday	Id-Meeled	
21.	01-12-2017	Priday	Christmas Day	
22.	25-12-2017	alonday	with instance to ay	
Last	This list does day of Moharar	not include n which fall on	09-04-2017 Mahaveer Jayanthi, 01-10-2017 Sundays.	
			PRESIDENT	
To				

Figure 3-4: List of Holidays-2017

Quality Audit Report of The Oxford College of Engineering, Bengaluru

## The list of holidays for the year 2018 is shown in figure 3-5.

( a sea		140,07700	CHILDREN'S	EDUCATION SOCIETY (Regd.) [Regn.No. 284/74-75]				
General II		THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1 <sup>st</sup> Phase, J.P. Nagar, Bangalore -560 078. (Recognized by Government of Karnataka) ©: 30410501/502, Fax: 30410569 E-mail: <u>info@theoxford.edu</u>						
	No.: C	ES/111/GH/2	1017-18	Date: 12-12-2017				
	0.000		NO	TIFICATION				
		Sub: Gener for th	al Holidays de Calendar Ye	eclared by the Government of Karnataka ear 2018.				
	Govern The O	The following nment of Karn sford Educatio	is the list ataka for the onal institution	of General Holidays declared by the Calendar Year 2018 as applicable for all solar.				
	01.1	Det	1.5					
	SLNO	Date	Day	Occasion				
	1.	15-01-2018	Monday	Uttarayana Punya Kala/Sankranti Festival				
	2.	26-01-2018	Friday	Republic Day				
	3.	13-02-2018	Tuesday	Maha Shivaratri				
	4.	29-03-2018	Thursday	Mahaveera Jayanthi				
	5.	30-03-2018	Friday	Good Friday				
	0,	18-04-2018	Wednesday	Basava Jayznthi				
	7.	01-05-2018	Tuesday	May Day				
	8.	16-06-2018	Saturday	Kutub-e-Ramzan				
	9.	15-08-2018	Wednesday	Independence day				
	10.	22-08-2018	Wednesday	Bakrid				
	11.	13-09-2018	Thursday	Varasiddhi Vinayaka Vrata				
	12.	21-09-2018	Friday	Last day of Moharam				
	13.	02-10-2018	Tuesday	Gandhi Jayanthi				
	14.	08-10-2018	Monday	Mahalaya Amavasye				
	15.	18-10-2018	Thursday	Maha Navami, Ayudhapooja				
	16.	19-10-2018	Friday	Vijayadashami				
	17.	24-10-2018	Wednesday	Maharshi Valmiki Jayanthi				
	18.	01-11-2018	Thursday	Kannada Raiyosthava				
	19.	06-11-2018	Tuesday	Naraka Chaturdashi				
	20.	08-11-2018	Thursday	Balipadyami, Deepavali				
	21.	21-11-2018	Wednesday	Id-Mcelad				
	22.	26-11-2018	Monday	Kanakadasa Jayanthi				
	23.	25-12-2018	Tuesday	Christmas Day				
	on 18-	This list does a 03-2018 & 14- If any of the H modified by no	not include Ch 04-2018 falling olidays for the tification of th	andramana Ugadi & Dr. Ambedkar Jayanthi g on Sundays respectively. e festivals of Muslim fraternity notified above e Government of Karnataka such notification				
	shall b	e automaticall Casual Leave o	y applicable. r Earned Leave	e shall not be sanctioned in combination with				
	any ho	olidays.						
				SNVL. NARASIMHA RAJU				
	To All the	Heads of The	Oxford Educati	PRESIDENT				

Figure 3-5: List of Holidays-2018

The list of holidays for the year 2019 is shown in figure 3-6.



Figure 3-6: List of Holidays-2019

The list of holidays for the year 2020 is shown in figure 3-7.

	THE	OXFORD Site Ne. 40, 30 (Reco) 30410501/502,	(kegn No. 254/74-75) EDUCATIONAL INSTITUTIONS <sup>A</sup> Main, 1" Phase, J.P. Nagar, Bangalore-500 078. gaized by Government of Karmataka) Fax: 30410569 E-mail: info@ubecuford.edu
No.t Cl	ES/111/GH/201	9-20	Date: 01-01-2010
apier-	Sub: General Ho for the Ca	olidays decla lendar Year	ared by the Government of Karnataka 2020.
Th Karnata)	e following is the ca for the Calend	e list of Gene ar Year 2020	as applicable for all The Oxford Educational
Instatutes.	Date	Day	Occasion Cankranti
SLN	- Date	Wednesday	Uttarayana Punya Kala/Makara Sankrana
145	13-01-2020	Friday	Maha Shivaratri
12	21-02-2020	Wednesday	Ugadi
130	25-03-2020	Monday	Mahaveera Jayanthi
1	10.04-2020	Friday	Good Friday
LP	10-04-2020	Theaday	Dr. BR Ambedkar Jayanthi
3.6.	14-04-2020	Edday	May Day
D.	01-05-2020	Monday	Kutub-E-Ramzan
08	25-05-2020	Saturday	Bakrid
A. 1	01-08-2020	Saturday	Independence Day
18	15-08-2020	Saturday	Ganesha Chathurthi
	22.08-2020	Thursday	Mahalaya Amavasye
and a state	17.09-2020	Friday	Mahathma Gandhi Jayanthi
13	02-10-2020	Monday	Vijaya Dhashami
IN.	20-10-2020	Friday	Id-e-Milad
10	30-10-2020	Saturday	Valmiki Jayanthi
10	14-11-2020	Saturday	Naraka Chathurdashi
M	16-11-2020	Monday	Balipadyami, Deepawali
10	03.12.2020	Thursday	Kanakadasa Jayanthi
19	05.12.2020	Friday	Christmas
Mahan 26-04- 1 modifie	his list does not avami/Ayudha Po 2020, 30-08-2020 f any of the Holis ad by notification aritally applicable	include Rep oola and Kan 0, 25-10-2020 days for the a of the Gow	ublic Day, Basava Jayanthi, Last Day of Monart nada Rajyotsava falling on Sundays on 26-01-20 and 01-11-2020 respectively. festivals of Muslim fraternity notified above st restivals of Karnataka, such notification shall
autom	ideally apparent	-	the senetioned for prefixing or suffixing
	Casual Leave or E	arned Leave	anal not be anticoldays.
- for any	intervening work	ung cashe an e-	
-	*		SNVL. NARASIMHA RAJU PRESIDENT
	Contraction of the second s		
To			-1 Institutions

Figure 3-7: List of Holidays-2020

The list of holidays for the year 2021 is shown in figure 3-8.



Figure 3-8: List of Holidays-2021

#### 3.2.6.2. Tentative Schedule of College

The tentative schedule of the college is 09.00 AM to 4:15 PM.

The library timing is 09:00 AM to 10:00 PM.

The details of the class sessions are given in table 3-2.

S. No.	Session	Timings
1	1 <sup>st</sup> Hour	09:00 TO 9:55AM
2	2 <sup>nd</sup> Hour	09:55 TO 10:50 AM
3	Short Break	10:50 TO 11:00 AM
4	3 <sup>rd</sup> Hour	11:00 TO 11:55 AM
5	4 <sup>th</sup> Hour	11:55 TO 12:50 PM
6	Lunch	12:50 TO 01:30 PM
7	5 <sup>th</sup> Hour	1:30 TO 2:25 PM
9	6 <sup>th</sup> Hour	2:25 TO 3:20 PM
10	7 <sup>th</sup> Hour	3:20 TO 4:15 PM

#### Table 3-2: Tentative College Schedule

#### 3.2.6.3. Staff and Students of College:

The number of staff including teaching, non-teaching, and house-keeping is given in the table 3-3. The number of students includes both boys and girls.

S. No.	Year	Teaching Staff	Non- Teaching staff	Total Staff	Total Students
1	2017	303	122	425	3572
2	2018	285	95	380	3044
3	2019	269	92	361	3124
4	2020	240	68	308	2728
5	2021	222	57	279	2722

#### Table 3-3: Number of staff and students

Quality Audit Report of The Oxford College of Engineering, Bengaluru

# 4. ENERGY AUDIT

# 4.1. Facility Description

The Oxford College of Engineering (TOCE) campus receives power supply from the state electricity board (BESCOM – Bangalore Electricity Supply Company Limited) at HT 11 kV. The TOCE has availed power supply, with connection - RR. No 5450996261 (S8HT60) with 1HT2C2 tariff.

Incoming power supply from BESCOM is received at the transformer yard located inside the college premises. The 11 kV rated HT power supply is stepped down to LT 433V, by 500 kVA rated transformers. Two numbers of 500 kVA rated each transformer units, have been installed in transformer yard to meet the power supply for the entire campus.

Transformer units installed inside college premises are shown in the figure 4.1.



Figure 4-1: Transformer units installed in the campus

S. No.	Description	Units	Transformer # 1	Transformer # 2
1	Rated Capacity	kVA	500	500
2	Rated Voltage Prim/Sec	kV	11/0.433	11/0.433
3	Rated Current Prim/Sec	А	26.24/666.66	26.24/666.66
4	Type of Cooling	-	ONAN	ONAN
5	Frequency	Hz	50	50
6	Impedance	-	4.86%	4.86%
7	Phase	-	3	3

The name plate details of transformer are given in table 4-1.

### Table 4-1: Name plate details of transformer

The LT power supply from the transformer is taken to the main electrical panels, located inside the power house room near the transformer yard.

From the power house main electrical panels, power supply is catered to engineering new block, engineering old block, girl's hostel block and Dental college. From the main panels of the individual block/ building, power supply is distributed to various floors/sections of the block/ building.

The main electrical panel-1 located in power house room is shown in figure 4.2.



Figure 4-2: Power house room - Main electrical panel 1

The main electrical panel-2 located in power house room is shown in figure 4.3.



Figure 4-3: Power house room - Main electrical panel 2

The electrical distribution panel at engineering new block is shown in figure 4.4.



Figure 4-4: Electrical distribution panel - Engineering new block

The electrical distribution panel-1 at engineering old block is shown in figure 4.5.



Figure 4-5: Electrical distribution panel 1 - Engineering old block

The electrical distribution panel-2 at engineering old block is shown in figure 4.6.



Figure 4-6: Electrical distribution panel 1 - Engineering old block

The electrical distribution panel at girl's hostel block is shown in figure 4.7.



Figure 4-7: Electrical distribution panel - Girl's hostel block

## **APFC Panel:**

APFC (Automatic Power Factor Controller) panels are installed at the power house room. One number of 60 kVAr rated and one number of 150 kVAr rated, capacitor banks have been installed for power factor improvement.

The APFC panels installed at power house room are shown in figure 4.8.



Figure 4-8: APFC panels at power house room

## DG Set:

Three number of DG (Diesel Generator) sets are used as backup power supply, during power failure from the grid. DG set #1 and DG set #2 are 250 kVA rated capacity each. DG set #3 is 500 kVA rated capacity.

DG set #1 caters power supply to girl's hostel block and dental college block. Whereas, DG set #2 acting as stand-by.

DG set #3 caters power supply to engineering new block and engineering old block. The image of DG set 1 installed at the power house room is shown in the figure 4.9.



Figure 4-9: DG set 1 - 250 kVA

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The image of DG set 2 installed at the power house room is shown in the figure 4.10.



Figure 4-10: DG set 2 - 250 kVA





Figure 4-11: DG set 3 - 500 kVA
S. No.	Description	Unit	DG # 1	DG # 2	DG # 3
1	Rated Capacity	kVA	250	250	500
2	Rated voltage	Volts	415	415	415
3	Rated current	Ampere	348	348	695.6
4	Frequency	Hz	50	50	50
5	Power factor	-	0.80	0.80	0.8
6	Rated Demand	kVA	250	250	500
7	Rated Power	kW	200	200	400
8	Make	-	Powerica	Powerica	Powerica

The name plate specifications of the DG sets are shown in the table 4.2.

### Table 4-2: DG set specifications

### DG Changeover:

The changeover between BESCOM power and DG power supply is done automatically. For changeover, three AMF (Automatic Mains Failure) panels are available in power house room.

The AMF panel 1 is shown in figure 4.12.



Figure 4-12: AMF panel - 1

The AMF panel 2 is shown in figure 4.13.



Figure 4-13: AMF panel - 2

The AMF panel 3 is shown in figure 4.14.



Figure 4-14: AMF panel - 3

### **UPS System:**

UPS is available in the campus to give the backup power supply for all the critical loads like computer labs, server rooms etc. List of UPS system with its rated capacity is given in the table 4.3.

S. No.	Block name	UPS make	Capacity	UPS-Serial No.	Loading department	Date of Installation
1	New building	Numeric	40 kVA	XII 110400125	Architecture & new	1/11/2011
2	2nd floor	Numeric	40 kVA	XII 110400127	building	1/12/2011
3		Numeric	15 kVA	3068	CAED lav(CV)	1/3/2000
4	Oldbuilding				2nd CSE Ground floor	
4	and floor	Numeric	40 kVA	130910965	Account section	1/9/2013
5	510 11001	Numeric	40 kVA	130808402	ISE lab	1/8/2013
6		Numeric	40 kVA	VI 050300099	Server room CSE lab	1/3/2005
7	Old building	Numeric	12.5 kVA	11130201068	ECE lab	1/2/2013
8	Ath floor	Numeric	12.5 kVA	11130201065	ECE lab	1/2/2013
9	401 11001	ACS	5 kVA	13FCL028	ECE R&D	1/10/2013
10	Old building	ACS	25 kVA	710IN008	CAD/CAM	1/7/2010
11	5th floor	ACS	25 kVA	6G0N085	SCRAP	1/7/2010
10	Engg. Lab 2nd				Language lab & main	
12 floor		ACS	10 kVA	7B0N007	library	-

Table 4-3: Details of UPS

## 4.1.1. Tariff Structure

The sanctioned contract demand of the campus is 490 kVA at specified voltage of 11 kV. Electricity supply from BESCOM is billed under 1HT2C2 schedule of tariffs. The tariff includes demand charges of Rs. 210 per kVA, and energy charges of Rs.7.85 per kWh.

The kVA demand charges @ Rs. 210/kVA of maximum demand recorded during the month or 85% of the contract demand, whichever is higher.

## 4.1.2. Electricity Consumption Data

Details of electricity consumption for the last five years have been collected and salient features of electrical energy details are given in table 4.4.

S. No.	Description	Unit	Details
1	Contract Demand	kVA	490
2	Demand Charges	Rs./kVA	210
3	Maximum Demand Recorded during	kVA	398
	last five years		
4	Average Monthly Energy Consumption	kWh	60259.36
	during last five years		
5	Average System Power Factor		0.92
6	Average Energy Charges considered for	Rs./ kWh	9.18
	savings calculations		

### Table 4-4: Electricity Bill Parameters

## 4.1.3. Load Share

The main electricity supply received to the power house, is distributed to the various blocks of the campus. Details of electrical load share of the campus are given in table 4.5. The percentage share of the various blocks is given in figure 4.15.

S. No.	Description	Unit	Details
1	Engineering College	kW	54.7
2	Hostel	kW	42.1
3	Dental College	kW	29.6
4	Canteen	kW	10.3
5	Utilities	kW	33.2
	Total load	kW	169.9

 Table 4-5: Electrical Load Breakup of the campus



## Figure 4-15: Load break-up of the campus

Figure 4.16 indicates the month wise recorded maximum demand and month wise energy consumption of the college campus during the year 2016-2017 (Apr 2016 to Mar 2017).



Figure 4-16: Month wise Recorded Maximum Demand and Energy Consumption-2016-2017

Figure 4.17 indicates the month wise recorded maximum demand and month wise energy consumption of the college campus during the year 2017-2018 (Apr 2017 to Mar 2018).



Figure 4-17: Month wise Recorded Maximum Demand and Energy Consumption-2017-2018

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Figure 4.18 indicates the month wise recorded maximum demand and month wise energy consumption of the college campus during the year 2018-2019 (Apr 2018 to Mar 2019).



Figure 4-18: Month wise Recorded Maximum Demand and Energy Consumption-2018-2019

Figure 4.19 indicates the month wise recorded maximum demand and month wise energy consumption of the college campus during the year 2019-2020 (Apr 2019 to Mar 2020).



Figure 4-19: Month wise Recorded Maximum Demand and Energy Consumption-2019-2020

Figure 4.20 indicates the month wise recorded maximum demand and month wise energy consumption of the college campus during the year 2020-2021 (Apr 2020 to Mar 2021).



Figure 4-20: Month wise Recorded Maximum Demand and Energy Consumption-2020-2021

# 4.2. SRTPV (Solar Roof Top Photo-Voltaic) system

SRTPV system was installed at the terrace of engineering new block and is of **202.48 kWp** rated capacity. The SRTPV is On-grid system, installed and maintained by Amplus Solar Power Private Limited. Totally, there are 616 solar modules and 4 inverters are installed at terrace. The SRTPV system is installed during February 2019.

S. No. Description Solar PV module Inverter 1 Make Trina Solar SMA 2 Multi crystalline SMA-Solid Q 50 Type 3 202 kWp 50 kW - 3φ Capacity 325 Wp -165 Modules 4 330 Wp -456 Modules Quantity 4 No.s Total: 616 Modules

The details of Solar PV modules and inverters are given in table 4.6.

### Table 4-6: Details of Solar PV modules and Inverters

The commissioning report of SRTPV system is shown in figure 4.21 and 4.22.



Figure 4-21: Commissioning report of SRTPV system-Page 1



Figure 4-22: Commissioning report of SRTPV system -Page 2

The SRTPV modules installed at terrace of the engineering new block is shown in figure 4.23.



Figure 4-23: SRTPV system- Engineering new block terrace

Inverters at terrace of engineering new block are shown in figure 4.24.



Figure 4-24: Inverters at terrace of engineering new block

SRTPV metering panels installed at ground floor of engineering new block are shown in figure 4.25.



Figure 4-25: SRTPV metering panel

The solar power generated is utilized for the entire campus. The excess power generated from SRTPV system is wheeled to the electricity board grid.

Figure 4.26 indicates the month wise energy consumption of the college campus from SRTPV system during the year 2019.



### Figure 4-26: Month wise Energy Consumption from SRTPV system-2019

Figure 4.27 indicates the month wise energy consumption of the college campus from SRTPV system during the year 2020.



Figure 4-27: Month wise Energy Consumption from SRTPV system-2020

Figure 4.28 indicates the month wise energy consumption of the college campus from SRTPV system during the year 2021.



Figure 4-28: Month wise Energy Consumption from SRTPV system-2021

Energy generation and net profit due to the SRTPV system is estimated and the same is given in the figure 4.29.



Figure 4-29: Net profit due to the SRTPV system

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# 4.3. Inventory Details - Electrical Appliances

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, computers, projectors, printers, scanners etc., During the study, inventory list from each department was collected and the same is given in table 4-7.

		Flore Tube	scent Light	LE	D	CFL	Fa	n	Cor	nputer	Exha	e	an Print ers ers	Xer	r CC Came e ra	TV Scre en	Proje ctor	AC	
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1	AUTO ENGG	64	0	12	0	0	26	6	5	0	0	1	2	0	0	0	1	0	
2	BT	86	0	0	0	0	42	0	10	9	2	2	2	2	8	0	1	2	4
3	Chemistry	0	0	17	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
4	CSE	52	0	141	0	0	59	13	3	218	0	0	0	4	0	12	0	5	1
5	Civil	52	0	16	0	0	56	4	30	0	0	1	3	0	0	0	0	0	
6	ECE	81	0	0	0	0	44	11	48	0	3	0	4	0	7	0	3	1	
7	EEE	48	2	0	6	0	54	2	41	0	0	0	2	0	7	0	1	0	0
8	ISE	34	0	77	0	0	29	5	128	0	0	0	2	0	0	0	1	0	
9	Library	0	45	0	0	0	53	0	30	0	0	1	1	0	0	0	0	0	
10	Maths	16	0	0	0	0	14	1	5	0	0	0	7	0	0	0	0	0	
11	MBA	39	0	0	0	96	42	0	16	0	0	0	2	0	0	0	3	3	
12	MCA	51	0	0	0	0	31	0	242	0	0	0	2	0	3	0	0	9	
13	MECH	89	0	0	0	0	59	0	84	0	2	0	2	0	5	2	3	0	
14	MTE	24	0	0	0	0	19	0	3	0	0	0	1	0	4	0	1	0	
15	PHYSICS	39	0	0	0	0	27	1	2	0	0	0	1	0	6	0	0	0	
Tot	al (College)	675	47	263	6	96	567	43	647	227	7	5	31	6	40	14	14	20	5
То	tal(Hostel)	413	0	71	0	0	431	0	1	0	0	0	1	0	0	0	0	0	0
Tot	tal (Overall)	1088	47	334	6	96	998	43	648	227	7	5	32	6	40	14	14	20	5

Table 4-7: Consolidated list of inventories

## 4.4. Best Practices Implemented for Energy Conservation

During the study, observations were carried out on the usage of the inventories in the college building premises. In the intension of saving the electricity, various measures have been adopted in the college. After completion of class hours – fans, lights, computers and AC units are found to be turned OFF. This practice is followed across the college premises (class rooms, labs, staff rooms, office rooms and library).

## 4.4.1. Day-light Integration

During the audit phase classrooms, Staff-rooms, computer lab, seminar hall, UPS & batteries room and library areas were surveyed for illumination levels and fresh aircirculation. It was observed most of the rooms are well ventilated and day-light integrated; sample photos of daylight integration are shown in figure 4.30 and 4.31.



Figure 4-30: Day-light integration at Class room



Figure 4-31: Day-light integration at laboratory

The images of daylight integration at college premises are shown in figure 4.32 and 4.33.



Figure 4-32: Day-light integration at engineering old block



Figure 4-33: Day-light integration at engineering new block

## 4.4.2. Installation of LED lights

Many of the FTL in all the blocks of the campus are replaced with LED lights. LED tube lights are used in the class rooms, staff-rooms, corridors, hostel, dining area, street lighting and in labs. Sample photo of LED lamp used in the some of the locations of the college area are shown in figure 4.34 and 4.35.



Figure 4-34: Use of LED lights at engineering new block -office area



Figure 4-35: Use of LED lights at engineering new block - at labs

The sample bill copy of LED tube light purchase is shown in figure 4.36.

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Figure 4-36: LED tube light - Sample purchase bill

## 4.4.3. Installation of LED street lights

In college premises, LED street lights are installed all around the campus. The image of LED street light fixture is shown in figure 4.37.



Figure 4-37: Use of LED street lights

The sample bill copy of LED street light is shown in figure 4.38.



Figure 4-38: LED street light - Purchase bill

S. No.	Description	Unit	Values
1	Rated Wattage of LED street light installed	W	75
2	Quantity of LED street lights installed	Nos	64
3	Rated wattage if conventional fixtures used	W	100
4	Savings due to installation of one LED street light	W	25
5	Total savings (considering all LED street lights)	kW	1.6
6	Working hours per day	hours	12
7	No. of working days per year	days	365
8	Annual electricity savings	kWh	7008
9	Average electricity cost	Rs./kWh	9.18
10	Annual cost savings achieved per year	Rs. lakh/year	0.64
11	CO <sub>2</sub> mitigations per year	Tons/year	5.96

The cost savings due to existing LED street lights are given in table 4.8.

### Table 4-8: Annual cost savings by installation of LED street lights

The cost savings due to existing 1x20 W LED fixtures are given in table 4.9.

S. No.	Description	Unit	Values
1	Rated Wattage of LED lamps installed	W	20
2	Quantity of LED lamps installed	Nos	263
3	Rated wattage of lamps used earlier	W	40
4	Savings per lamp by installation of LED lamps	W	20
5	Total savings	kW	5.26
6	Working hours per day	hours	9
7	No. of working days per year	days	250
8	Annual electricity savings	kWh	11835
9	Average electricity cost	Rs./kWh	9.18
10	Annual cost savings achieved per year	Rs. lakh/year	1.09
11	CO <sub>2</sub> mitigations per year	Tons/year	10.06

Table 4-9: Annual cost savings due to existing LED fixtures

## 4.4.4. Installation of Solar Water Heater

Solar water heaters are installed at terrace of girl's hostel for to provide hot water supply. Three solar water heaters with capacity of 3 kL each is available. Sample photo of solar water heaters used in the hostel are shown in figure 4.39.



Figure 4-39: Girl's hostel - Solar Water Heater system

S. No.	Description	Unit	Values
1	Solar water heater installed	L	9000
2	Total amount of heat produced	kCal/hr	270000
3	Electricity equivalent	kWh	314
4	No. of working days per year	days	250
5	Annual electricity savings	kWh	78488
6	Average electricity cost	Rs./kWh	9.18
7	Annual cost savings achieved per year	Rs. lakh/year	7.21
8	CO <sub>2</sub> mitigations per year	Tons/year	66.72

The cost savings by installation of solar water heaters of the campus are given in table 4.10.

Table 4-10: Annual cost savings by solar water heater

## 4.4.5. Usage of LED/LCD monitors

LCD monitors are used for all the desktop computers in office, staff rooms and in labs. Sample photos of the LCD monitors used in labs are as shown in the figure 4.40.



Figure 4-40: Use of LED/LCD monitors in the computer labs

## 4.4.6. Maintenance of logbooks and registers

The logbooks for DG diesel data and DG operating hours, lift maintenance activity registers are maintained properly.

#### Diesel log book for DG sets:

The sample image diesel log book for the year 2017 is shown in figure 4.41.



Figure 4-41: Diesel log book of DG sets - 2017

The sample image diesel log book for the year 2018 is shown in figure 4.42.



Figure 4-42: Diesel log book of DG sets - 2018

The sample image diesel log book for the year 2019 is shown in figure 4.43.

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Figure 4-43: Diesel log book of DG sets - 2019
The sample image diesel log book for the year 2020 is shown in figure 4.44.

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Figure 4-44: Diesel log book of DG sets - 2020

The sample image diesel log book for the year 2021 is shown in figure 4.45.

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Figure 4-45: Diesel log book of DG sets - 2021

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#### DG operating hours register:

The sample image of DG operating hour registers for the year 2017 is shown in figure 4.46.

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Figure 4-46: DG operating hours Register-2017

The sample image of DG operating hour registers for the year 2018 is shown in figure 4.47.

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Figure 4-47: DG operating hours Register-2018

The sample image of DG operating hour registers for the year 2019 is shown in figure 4.48.

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Figure 4-48: DG operating hours Register-2019

The sample image of DG operating hour registers for the year 2020 is shown in figure 4.49.

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Figure 4-49: DG operating hours Register-2020

The sample image of DG operating hour registers for the year 2021 is shown in figure 4.50.



Figure 4-50: DG operating hours Register-2021

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#### DG maintenance:

The DG sets are well maintained and monitored regularly. If any fault occurs in DG sets, then immediate attention is given and it is rectified.

The sample image of DG maintenance activity bill for the year 2017 is shown in figure 4.51.



Figure 4-51: DG maintenance activity bill - 2017

The sample image of DG maintenance activity bill for the year 2018 is shown in figure 4.52.

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Figure 4-52: DG maintenance activity bill - 2018

The sample image of DG maintenance activity bill for the year 2019 is shown in figure 4.53.

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Figure 4-53: DG maintenance activity bill - 2019

The sample image of 500 kVA DG field service report for the year 2021 is shown in figure 4.54.

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Figure 4-54: 500 kVA DG- Field service report - 2021

The sample image of 250 kVA DG field service report for the year 2021 is shown in figure 4.55.

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Figure 4-55: 250 kVA DG- Field service report - 2021

#### Lift Maintenance activity register:

Lift maintenance activity register is available. All complaints and rectification work related to lift maintenance is entered in this register.

The sample image of lift maintenance register for the year 2019 is shown in figure 4.56.

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Figure 4-56: Lift maintenance activity register -2019

The sample image of lift maintenance register for the year 2020 is shown in figure 4.57.

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Figure 4-57: Lift maintenance activity register -2020

The sample image of lift maintenance register for the year 2021 is shown in figure 4.58.

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Figure 4-58: Lift maintenance activity register -2021

The sample image of engineering new block lift repair bill is shown in figure 4.59.

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Figure 4-59: Engineering new block- Lift repair bill

90

# 4.4.7. Maintenance Team

The college has a separate electrical maintenance team. The team performs regular monitoring of the electrical distribution system which involves general monitoring of the system, identifying and rectifying of faults, and provide safe condition and operation of entire electrical distribution systems.

S. No.	Name	Designation
1	Mr. Narayana Raju	Electrician
2	Mr. Bilal Ahmed	Electrician
3	Mr. Manjunath	Electrician

The list of electrical maintenance team members is given in table 4-11.

Table 4-11: Electrical maintenance team

# 4.4.8. Awareness Programs

#### Awareness in Energy Conservation:

The Department of EEE in association with NSS unit of The Oxford College of Engineering organized a campaign 'Awareness on Energy Conservation'. Awareness posters, videos and notices regarding how to reduce energy consumption and electricity bills were explained to all the public in the Hongasandra, Begur Road.

The invitation for the campaign is shown in figure 4.60.



Figure 4-60: Awareness on Energy Conservation campaign - Invitation

Students indulged during the campaign is shown in figure 4.61.



Figure 4-61: Students during the campaign

# 4.5. Recommendations for Energy Audit

# 4.5.1. Replacement of conventional 1x40W FTL lamps with energy efficient 1x20W LED lamps

#### Background

From the inventory data; collected during study it is observed conventional FTL lighting fixtures are used in the campus. The power consumed by FTL in comparison with LED fixtures is 50% higher. Replacing the existing FTL with LED will result in energy savings.

#### Recommendation

It is recommended to replace the existing 1x40W FTL lamps with 1x20W LED tube lights.

#### **Energy Savings**

#### Engineering New & old block:

The energy savings and investment cost for replacement of FTL with LED fixtures and its payback period are given in table 4-12. The total number of 1x40W FTL fixtures is 675.

S. No.	Description	Unit	Values
1	Total no. of 1x40W FTL	No.s	675
2	Power consumption by 1x40W FTL	kW	27
3	% of savings if all FTL replaced by LED fixtures	%	50
4	% of savings in kW if replaced by LED fixtures (Considering all fixtures)	kW	13.5
5	%of Lights found to be ON during working hours	%	50
6	Energy savings for fixtures in ON condition (4 x 5%)	kW	6.75
7	Total working hours per day	hours	9.0
8	Annual savings (6 x <b>7</b> x <b>250days</b> )	kWh/Annum	15187.5
9	Average energy cost per kWh	Rs./kWh	9.18
10	Annual cost savings	Rs. lakh	1.4
11	Cost of LED per fixture	Rs.	350.0
12	Total Investment cost for 675 LED fixtures	Rs.lakh	2.4
13	Simple payback period (12 / 10)	Years	1.69
14	CO <sub>2</sub> mitigations per year	Tons/year	12.91

# Table 4-12: FTL to LED replacement cost and payback period calculations -Engineering new & old block

#### Hostel block

The energy savings and investment cost for replacement of FTL with LED fixtures and its payback period are given in table 4-13. The total number of 1x40W FTL fixtures is 413.

S. No.	Description	Unit	Values
1	Total no. of 1x40W FTL	No.s	413
2	Power consumption by 1x40W FTL	kW	16.52
3	% of savings if all FTL replaced by LED fixtures	%	50
4	% of savings in kW if replaced by LED fixtures (Considering all fixtures)	kW	8.26
5	%of Lights found to be ON during working hours	%	70
6	Energy savings for fixtures in ON condition (4 x 5%)	kW	5.78
7	Total working hours per day	hours	8
8	Annual savings (6 x <b>7</b> x <b>250days</b> )	kWh/Annum	11564
9	Average energy cost per kWh	Rs./kWh	9.18
10	Annual cost savings	Rs. lakh	1.1
11	Cost of LED per fixture	Rs.	350
12	Total Investment cost for 675 LED fixtures	Rs.lakh	1.4
13	Simple payback period (12 / 10)	Years	1.4
14	CO <sub>2</sub> mitigations per year	Tons/year	9.83

# Table 4-13: FTL to LED replacement cost and payback period calculations-Hostel block

# 4.5.2. Replacement of conventional fans with energy efficient fans

#### Background

1x65W conventional fans have been used in almost all the rooms of the college. Replacing the 1x65W conventional fans with 1x35W energy efficient fans will result in energy savings.

#### Recommendation

It is recommended to replace 65 W fans with 35 W EE fans, as procurement practice. Whenever the existing fans fails, while procuring 35W EE fans shall be procured.

#### **Energy Savings**

#### Engineering new block and old block:

The energy savings and investment cost for replacement of 65 W fans with 35 W EE fans and its payback period are given in table 4-14. Total number of 1x65W fans used accounts to around 567 numbers.

S. No.	Description	Unit	Details
1	Total no. of 1x65W Fans	No	567
2	Power consumption by 1x65W Fans (All fans)	kW	36.86
3	% of savings per fan if replaced by EE fan	%	45
4	% of savings in kW if all fans replaced by EE fans	kW	16.585
5	%of fans found to be ON during working hours	%	50
6	Energy savings for fans in ON condition (4 x 5%)	kW	8.29
7	Total working hours per day	hours	12.0
8	Annual savings (6 x 7 x 250days)	kWh/Annum	24877.1
9	Average energy cost per kWh	Rs./kWh	9.82
10	Annual cost savings	Rs. lakh	2.4
11	Cost of fan	Rs.	2500.0
12	Total Investment cost for replacing all fans	Rs. lakh	14.2
13	Simple payback period (12 / 10)	Years	5.80

#### Table 4-14: EE Fans replacement and payback period calculations

#### Hostel block

The energy savings and investment cost for replacement of 65 W fans with 35 W EE fans and its payback period are given in table 4-15. Total number of 1x65W fans used accounts to around 431 numbers.

S. No.	Description	Unit	Details
1	Total no. of 1x65W Fans	No	431
2	Power consumption by 1x65W Fans (All fans)	kW	28.02
3	% of savings per fan if replaced by EE fan	%	45
4	% of savings in kW if all fans replaced by EE fans	kW	12.607
5	%of fans found to be ON during working hours	%	50
6	Energy savings for fans in ON condition (4 x 5%)	kW	6.30
7	Total working hours per day	hours	12.0
8	Annual savings (6 x <b>7</b> x <b>250days</b> )	kWh/Annum	18910.1
9	Average energy cost per kWh	Rs./kWh	9.82
10	Annual cost savings	Rs. lakh	1.9
11	Cost of fan	Rs.	2500.0
12	Total Investment cost for replacing all fans	Rs. lakh	10.8
13	Simple payback period (12 / 10)	Years	5.80

Table 4-15: EE Fans replacement and payback period calculations-Hostel block

# 4.5.3. Awareness posters on energy conservation

To create more awareness on energy conservation, Posters stating 'Switch off lights, Fans & appliances when not in use' or 'Use electricity wisely' or 'Once the Electricity is used -It cannot be regained' etc., need to be placed on the walls at all the appropriate places.

# 5. ANNEXURES

# 5.1. Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

# 5.1.1. General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

#### 1. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 5-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	Ι				
2	II				
3	III				

#### Table 5-1: NAAC grading's Table

#### 2. Internal Quality Audit Team: 2020 – 2021

Table 5-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

#### Table 5-2: Internal Quality Audit team

#### 3. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 5-3.

99

S. No.	Description	Details	
1.	Name of the		
	College and		
	address:		
1.a	Head office		
	address :		
2.	Telephone/Fax		
	No		
3.	Co-ordinating	Name:	·
	officer:	Mob:	
		Email:	
4.	Year of		
	Establishment:		
5.	Hostel		
	(Available/Not		
	Available)		
6.	No. of Working		
	days/year		
7.	Brief description		
	of Campus		

# Table 5-3: General information of the college

#### 4. College Infrastructure

Infrastructure details of the college were gathered from table 5-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

#### Table 5-4: Detail Infrastructure of the college

- 5. Details of Student clubs
- 6. Details of cells that support students
- 7. Tentative Schedule of a working day:
- a. No. of working days per year:
- b. List of holidays:
- 8. Total area of the campus
- 9. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 5-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

#### Table 5-5: Details of the departments

#### 10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 5-6

	Teaching Staff	Non-teaching	Support Staff (Security,
S. No.		Staff	House Keeping)

101

Male	Female	Male	Female	Male	Female

#### Table 5-6: Details of the Staff

#### 11. Number of Students

Number of students is collected from table 5-7.

S. No.	Boys	Girls
1		

#### Table 5-7: Details of the Students

#### 12. Additional infrastructure details have been collected from table 5-8.

S. No.	Description	Details
1.	Number of blocks available for boys hostel	Nos.
2.	Number of rooms available for boys hostel	Nos.
3.	Number of blocks available for girls hostel	Nos.
4.	Number of rooms available for girls hostel	Nos.
5.	Whether Laundry is available in the hostel	Yes / No
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron )	
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No
9.	Whether lifts available in academic block	Yes / No
10.	Whether Kitchen is available in the academic block	Yes / No
11.	Whether any food counter (outside caterers) available in academic block	Yes / No

12.	Whether any commercial shops available in	Yes / No	
	academic block		
13.	Any more information or additional details of		
	academic block you would like to share -		
	kindly elaborate here		

#### Table 5-8: Details of the departments

# 5.1.2. Water Audit details:

#### 1. General information

General information required for water management analysis is collected from table 5-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	

S. No.	Description	Details
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well	
	water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

# Table 5-9: Water management details

#### 2. STP information

STP details are collected from table 5-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

#### Table 5-10: Details of STP

#### 3. RO Plant information

RO Plant details are obtained from table 5-11.

S. No.	Location	Quantity	Capacity
1.			
2.			

3.
----

Table 5-11: Details of RO Plant

# 5.1.3. Energy consumption details:

#### 1. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 5-12.

S. No.	Туре	Units		Value	Cost in Rs.	
1	Electricity	kWh	2019			
			2020			
2	LPG	Cylinders				
3	Diesel	Litres (Mont	h wise			
		consumption	for			
		the last two y	ears)			
4	Others resources					
	(Please specify)					
5	Total connected load	kW				
6	Contract demand	kVA				
7	Maximum demand	kVA				
	recorded					
8	Average power factor					
9	Energy charges	Rs./kWh				
10	Demand charges	Rs./kVA	Rs./kVA			
	* Attach Electricity Bill Copy of last 2 years					

#### Table 5-12: Details of Energy consumption

#### 2. Solar Energy details:

The solar energy details required are collected from table 5-13.

S.	Buildin	Solar water Heater			Solar PV System		
No	g No./	Capacit	Workin	Year of	Capacit	Workin	Year of
•	Name	у	g / Not	Installatio	у	g / Not	Installatio
			working	n		working	n

2				

#### Table 5-13: Details of Solar Energy

- 3. Solar Street lights details:
- a. Quantity -
- b. Capacity -
- c. Year of Installation -

# 4. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 5-14.

S. No.	Description	Details
1.	Number of Transformers Installed	Nos.
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No
4	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No
8	Whether Air Conditioning Units have been installed in the campus	Yes / No
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.
10.	Total number of computers available in the campus	Nos.
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.
12.	Whether water coolers are installed in the academic blocks	Yes/No

106

S. No.	Description	Detai	ils
13.	Type of lamps (Fluorescent Tube Light, CFL, LED,	Nos.	
	Incandescent, Sodium / Mercury lamps, etc.,)		
	installed in the campus		
14.	Type of fans (ceiling, wall mount, standing, exhaust,	Nos.	
	etc.,) installed in the campus		
15.	Whether exhaust fans are installed in hostel /	Yes /No	
	kitchen.(If Yes, share the quantity and installed		
	location)		
16.	Any other electrical equipment's in college buildings.		

# Table 5-14: Details of Electrical Equipment

- 5. List of energy saving initiatives implemented
- 6. List of energy saving initiatives in plan for future

# 5.1.4. Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

#### 1. Basic information

Basic information for waste management is collected from table 5-15.

S. No.	Description			
1	Whether wet and dry garbage segregation is done inside the			
	campus.			
2	Whether garbage is given to external agencies / municipal agencies?			

#### Table 5-15: Basic details of waste management

#### 2. Types of Waste generated

Types of waste generated in the college are obtained from table 5-16.

S. No.	Description	Yes /	Remarks
		No	
1	E-Waste (Computers, electrical and electronic parts)		
2	Hazardous / Chemical Waste		
3	Solid Waste (Damaged furniture, paper waste, paper		
4	Dry Leaves		
5	Food Waste		
6	Waste Water (Washing, urinals, bathrooms)		
7	Glass Waste (Broken glass wares from the labs)		
8	Unused Materials		
9	Plastic Waste (Pen, Refill, Plastic water bottles and		
	other plastic containers, wrappers etc.)		

## Table 5-16: Types of waste generated

#### 3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 5-17.

108	Quality Audit Report of The Oxford College of Engineering, Bengaluru

S. No.	Location	Bio- degradable	Non- Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

#### Table 5-17: Segregation of waste

#### 4. Waste generation management

Waste generation management of the college was collected from table 5-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

#### Table 5-18: Waste Disposal methods

# 5.1.5. Green campus management details:

#### 1. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 5-19

Description	Details
Total number of plant species identified	
Total number of plants on the campus	
Total number of Trees on the campus	
Garden area inside the college –	
Total number of medicinal plants /trees on the campus	
Total number of vegetables and fruits plantation in the	
campus	
Whether display boards are given to plants and trees for identification	
	DescriptionTotal number of plant species identifiedTotal number of plants on the campusTotal number of Trees on the campusGarden area inside the college –Total number of medicinal plants /trees on the campusTotal number of vegetables and fruits plantation in thecampusWhether display boards are given to plants and trees foridentification

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8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

#### Table 5-19: List of plantation details

# 2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 5-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 5-20: List of plants/trees in campus
## 5.1.6. Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 5-21.

S. No	Description Details						
1	Whether college provides transport facility for staff and students (Yes/No)						
2	Number (or Percentage) of staff using transport services provided by college						
3	Number (or Percentage) of students using transport services provided by college						
4	Number (or Percentage) of Staff using public transport						
5	Number (or Percentage) of Staff using Bike						
6	Number (or Percentage) of Staff using Car						
7	Number (or Percentage) of students using Public transport						
8	Number (or Percentage) of students using Car						
9	Number (or Percentage) of students using Bike						
10	Number (or Percentage) of students using Bicycles						
11	Average consumption of diesel per month						
12	Average electricity consumption per month	Average electricity consumption per month					
13	Average LPG consumption per month						

## Table 5-21: Details of Carbon footprint management

## 5.1.7. Photos required for Audit:

## 1. General Photos

111

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 5-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

6	Photos of any other policies adopted by college		
7	Photos of water test	Drinking Water	
		STP processed water	
		Bore-well water	
		Other water Sources (Like Tanker water and any	
	report	other)	
8	Photos of use of Energy efficient devices like fan, bulbs etc.		
9	Photos of LCD/LED monitors used in Labs		
10	Photos of dry and wet waste collection bins		
11	Photos of celebrating World Environment Day		
12	Photos of celebrating World Water Day		
13	Photos of celebrating World Earth Day		
14	Photos of celebrating World Ozone Day		

Table 5-22: List of photos

# **QUALITY AUDIT REPORT**

# ON

# **ENVIRONMENT AUDIT**

OF

# THE OXFORD COLLEGE OF ENGINEERING 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



ENHANCING RESOURCE EFFICIENCY

# **QUALITY AUDIT REPORT**

# OF

# 'THE OXFORD COLLEGE OF ENGINEERING'

## 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



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## For More Information

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## **PROJECT ADVISOR**

- Mr. Prabu Das, M. Tech
- Ms. Aparna Reddy, B.Arch., MBA

## **ACKNOWLEDGEMENTS**

We are thankful to the management of **The Oxford College of Engineering**, **Bengaluru**, for the support, guidance and, giving us the opportunity to be involved in this very interesting and challenging assignment.

We would be happy to provide any further clarifications, if required, to facilitate the implementation of the recommendations.

We received full co-operation and support from the concerned personnel/ staff members of the college. We would like to thank:

Chairman – The Oxford Educational Institutions

The Oxford College of Engineering

And other Staff in personnel who have given full co-operation and support. They took a keen interest and gave valuable inputs during the course of study.



# EEELLP ACKNOWLEDGEMENT

EEELLP team thanks the management of **The Oxford College of Engineering, Bengaluru** for assigning this interesting work to us. We appreciate the co-operation extended to our team during the entire process.

Our special thanks are due to Principal & Team of colleagues for giving us necessary inputs to carry out this very vital exercise. We would like to thank all the head of the departments and staff members who were actively involved while collecting the data and conducting field measurements.

# DISCLAIMER

The Audit Team has prepared this report for The Oxford College of Engineering, Bengaluru based on the input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

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

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

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# **ABBREVIATION AND ACRONYMS**

1.	А	:	Amperes	
2.	AC	:	Air Conditioner	
3.	APFC	:	Automatic Power Factor Controller	
4.	AMF	:	Automatic Mains Failure	
5.	BBMP	:	Bruhat Bengaluru Mahanagara Palike	
6.	BESCOM	:	Bangalore Electricity Supply Company	
7.	BWSSB	:	Bangalore Water Supply and Sewerage Board	
8.	CC Camera	:	Closed Circuit Camera	
9.	DG	:	Diesel Generators	
10.	EE Fan	:	Energy Efficient Fan	
11.	E-Waste	:	Electronic Waste	
12.	FTL	:	Fluorescent Tube Light	
13.	GHG	:	Green House Gas	
14.	Hz	:	Hertz	
15.	HP	:	Horse Power	
16.	ΗT	:	High Tension	
17.	Ι	:	Current	
18.	ICT	:	Information and Communications Technology	
19.	IQAC	:	Internal Quality Assurance Cell	
20.	ISO	:	International Organization for Standardization	
21.	kgs	:	Kilograms	
22.	kL	:	Kilo Liters	
23.	kV	:	kilo volt	
24.	kVA	:	kilo volt ampere	
25.	kVAr	:	Reactive kilo volt ampere	
26.	kW	:	Kilo Watt	
27.	kWh	:	kilo Watt hour	
28.	kWp	:	kilo Watt peak	
29.	LCD	:	Liquid Crystal Display	
30.	LED	:	Light Emitting Diode	
31.	LT	:	Low Tension	
32.	mA	:	Milli Amperes	
33.	MoU	:	Memorandum of Understanding	
34.	NA	:	Not Applicable	
35.	NAAC	:	National Assessment and Accreditation Council	
36.	NSS	:	National Service Scheme	
37.	OHT	:	Over Head Tank	
38.	Prim/Sec	:	Primary/Secondary	
39.	PF	:	Power factor	
40.	Ph.D.	:	Doctor of Philosophy	

41.	PV	:	Photo Voltaic
42.	RCC	:	Reinforced Cement Concrete
43.	RO	:	Reverse Osmosis
44.	RR. No.	:	Revenue Register Number.
45.	Sq. Ft.	:	Square Feet
46.	Sq.m.	:	Square Meter
47.	SRTPV	:	Solar Roof Top Photo Voltaic
48.	TL	:	Tube Light
49.	TR	:	Ton of Refrigeration
50.	TV	:	Television
51.	V	:	Volts
52.	W	:	Watts
53.	Wi-Fi	:	Wireless Fidelity
54.	Wp	:	Watt peak
55.	#	:	Number

## **1. INTRODUCTION**

The Oxford College of Engineering was started in the year 2000, is one of the most prestigious institutions in Bengaluru that provides quality teaching and training in professional UG courses in 10 streams of Engineering in, Computer Science, AIML, Electronics and Communication, Electrical and Electronics, Mechanical, Civil, Bio-Technology, Mechatronics & Automobile. College also offers 10 Postgraduate programs in Technology (M. Tech), Computer Application (MCA) and Business Administration (MBA), and 11 Research centers recognized by VTU to offer Ph.D. programs. College is affiliated with the Visvesvaraya Technological University (VTU) and approved by the All-India Council for Technical Education (AICTE). The college also has been accredited by the NBA, and IAO quality-assessed organizations. The Institute name is also included in the NIRF & AICTE CII Survey of Industry Linked Technical Institute- 2020. Institution is categorized in Band promising in ARIIA ranking in the year 2021. The college is set in a sprawling 11.5 acres campus in the prestigious IT corridor, ideal for education in a serene environment with over 85,000 square meters of built-up area spread over 2 blocks, with enormous investment for academic purposes. The college has well equipped with state-ofthe-art infrastructure facilities to carry out various real-time projects, research, and consultancy activities in recent technologies. All the Departments have undertaken many research/consultancy projects funded both by multinationals and government agencies. The college has a good number of research publications in various reputed journals and patents. College has a good number of R&D projects sponsored by AICTE, VGST, VTU, IEEE, ICMR BRNS, NIF, NRB(DRDO) & BIRAC. It has a history of excellent placement track record in various multinational companies' offers with high salary packages.

### VISION

To develop competent students with good value systems and face challenges of the continuously changing world.

### MISSION

To be respected and most sought-after engineering educational institutions engaged in equipping individuals capable of building learning organizations in the new millennium.

### QUALITY POLICY

Quality Audit Report of The Oxford College of Engineering, Bengaluru

1

To equip the students with highest standard of education, knowledge and ethics. To prepare them to meet the challenges of life with full confidence. Aim at all round development of the personality to be useful citizens.

## Campus Area and Built-up area

The area of the campus (built up and total) area is given in table 1-1.

S.	Description	Units	Details
No.			
1	Engineering Campus total area	Acres	11.5
2	Built up area	Sq. mt.	85,000

### Table 1-1: College Area

### **Committee and Cells**

The Oxford College of Engineering (TOCE) has various functional committees and cells. They are listed below,

- VTU/AICTE Committee
- Planning & Accreditation Committee
- o Library Committee
- Research and Development Committee
- Training & Placement Committee
- o Faculty Development Committee
- o Purchase & Budget Committee
- o College Magazine/Calendar /Newsletter Committee
- o Professional Societies / Chapters
- o Cultural Association
- o Alumni Association
- o Sports Committee
- Quality Audit Report of The Oxford College of Engineering, Bengaluru

- o NSS
- o Students Grievances Redressal Committee
- o Discipline Committee
- o Women's Grievance Redressal Committee
- o Anti-sexual Harassment Committee
- o Entrepreneurship & Incubation cell
- o Anti-Ragging Committee
- o Website, Server & Internet Committee
- o Public Relation Committee
- o Hostel & Canteen Committee
- o Prevention of Caste Based Discrimination Cell
- o College Internal Complaints Committee
- o Internal Task Force Team COVID 19 Coordination Committee
- o Internal Quality Assurance Cell (IQAC)
- o Exam Cell
- o Disability Recourse Centre
- o IPR Cell
- o IA Answer Scripts Evaluation Review Committee
- o IA Question Paper Scrutiny Committee

## Internal Quality Assurance Cell (IQAC)

The college management constitutes the Internal Quality Assurance Cell including Principal, teaching faculty, non-teaching faculty, UG students (Male & Female), PG students (Male & Female), alumni, parent and industry representatives every year.

The list of Internal Quality Assurance Cell members for the academic year 2016-2017 is shown in figure 1-1.



#### Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2016

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SI.No	Name of Member	Designation	Role				
1.	Dr. Praveena Gowda	Principal	Chairperson				
2.	Dr. Malleshalah T.S.	Professor, Dept. of Civil Eng.	Member -Teaching Faculty Representative				
3.	Mrs. Uma	Office Staff	Member – Non Teaching Faculty Representative				
4.	Ms. Shilpa	ECE Student	Member – UG Female Student Representative				
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative				
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative				
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student membe Representative				
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member – Alumni Representative				
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member -Parent Representative				
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative				
11.	Dr. Mallikarjun K	Professor & Head Maths	Member - Coordinator				
12.	Prof.Devi Vighneshwari	Asst. Prof in EEE	Joint Coordinator				

Copy to:

PRINCIPAL 1. Chairman and Vice Chairman The Oxford College of Engineering 2. Committee Members Bommanehalli, Hosur Road 3. All the HOD's Bongaluru-580 068 4. IQAC File

Figure 1-1: List of IQAC members 2016-2017

The list of Internal Quality Assurance Cell members for the academic year 2017-2018 is shown in figure 1-2.



Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2017

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will er orders are issued. Following is the constitution of IQAC.

	De on same unarroren	Designation	Role			
SI.NO	Marine Or Mieriden	Principal	Chairperson			
1.	Dr. Praveena Gowda	Professor, Dept. of Civil Eng.	Member -Teaching Faculty Representative			
3.	Mrc Uma	Office	Member - Non Teaching Faculty Representative			
4.	Ms. Shilpa	ECE Student	Member – UG Female Student Representative			
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative			
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative			
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student membe Representative			
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker	Member – Alumni Representative			
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member – Parent Representative			
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative			
	De Mallibarius K	Professor & Head Maths	Member - Coordinator			
11.	Dr. Mankarjun k	Asst. Prof in EEE	Joint Coordinator			
12.	Prof.Devi Vighneshwari	Asst. Prof in EEE	Amer			

Copy to: 1. Chairmanand Vice Chairman 2. Committee Members

4. IQAC File

3. All the HOD's



The Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-560 068

Figure 1-2: List of IQAC members 2017-2018

The list of Internal Quality Assurance Cell members for the academic year 2018-2019 is shown in figure 1-3.



#### Proceedings of the Principal and Chairperson IQAC

Order

#### Date: 27/07/2018

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SI.No	Name of Member	Designation	Role					
1.	Dr.Praveena Gowda	Principal	Chairperson					
2.	Dr. Malleshaiah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative					
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative					
4.	Ms.Ashmitha Dale Pais	CSE Student	Member – UG Female Student Representative					
5.	Mr.Vishal Nadig	EEE Student	Member - UG Male Student Representative					
6.	Ms.Dechekka K U	MBA Student	Member – PG Female Student Representative					
7.	Mr.Manoj P	MCA Student	Member – PG Male Student member Representative					
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative					
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative					
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative					
11	Dr. Mallikariun K	Professor& Head Maths	Member - Coordinator					
12	Prof Devi Viehoeshwari	Asst. Prof in EEE	Joint Coordinator					

#### Copy to:

1. Chairman and Vice Chairman

2. Committee Members

3. All the HOD's

4. IQAC File



Principal'& Chairperson IQAC PRINCIPAL Ine Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-550 068.

### Figure 1-3: List of IQAC members 2018-2019

The list of Internal Quality Assurance Cell members for the academic year 2019-2020 is shown in figure 1-4.



Proceedings of the Principal and Chairperson IQAC Order

Date: 27/07/2019

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will governing body. These orders are issued. Following is the constitution of IQAC

	be on same until further o	Designation	Role				
1.No	Name of Member	Principal .	Chairperson				
1.	Dr.A.S.Aravind	Principal	Member -Teaching Faculty				
2.	Dr. Malleshalah T.S	Head, Dept. of Civil Eng.	Representative				
	Dr. Wateshearthy		Member - Non Teaching Faculty				
3.	Mrs.Uma	Office Staff	Representative				
	The store st		Member – UG Female Student				
4.	Ms Ashmitha Dale Pais	CSE Student	Representative				
			Member - UG Male Student				
5.	Mr VishalNadig	EEE Student	Representative				
	Na. The start of t		Member - PG Female Student				
6.	Ata Duchakka KU	MBA Student	Representative Member – PG Male Student				
	MS.Decretka H o						
7.	Mar Manol P	MCA Student	member Representative				
	Wir,manoj *	Cooler Collupte Engineer, Netcracker	Mambar - Alumni Representative				
8.	Mr Srinkas AS	Technologies Bangalore	Member - Additin Representative				
	Ma.Stantes	Recent (of Male)	Member -Parent Representative				
9.	Mr.C.Prakash	Parent (of Female)					
	Mr.B.R.MHemaMaheshwar	Parent (or remain)					
10		General Manager, Power Train &	Member - Industry Representativ				
10.	Mr.Shamin Dudu	Emobility, Robert BOSCH Engineering a					
		Business Solutions Lto, Bangalore					
11.	Dr. Shashidhar	Professor & Head MCA	Member - Coordinator				
			Joint Cogrdinator				
12	Prof Devi Vighneshwari	Asst. Prof in EEE	and al al summer				

#### Copy to:

1. Chairmanand Vice Chairman

- 2. Committee Members
- 3. All the HOD's
- 4. IQAC File



## Figure 1-4: List of IQAC members 2019-2020

The list of Internal Quality Assurance Cell members for the academic year 2020-2021 is shown in figure 1-5.





Proceedings of the Principal and Chairperson IQAC Order

Date:17/08/2020 By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Followides it the constitution of DOC

SI No.	Name of Member	Designation	Role
1.	Dr.A.S.Aravind	Principal	Chairperson
2.	Dr. Malleshalah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative
4,	Ms.Sahana H G	CSE Student	Member – UG Female Student Representative
5.	Mr.Dildar Bashir	EEE Student	Member – UG Male Student Representative
6.	Ms. Dhanyatha K	MBA Student	Member – PG Female Student Representative
7.	Mr.Anmol	MCA Student	Member – PG Male Student member Representative
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative
11.	Dr. Mallikarjun K	Professor& Head Maths	Member - Coordinator
12	Prof.Devi Vighneshwari	Asst. Prof In EEE	Joint Coordinator
Cop 1 2 1 4	y to: Chairman and Yoe Chairman Conneittee Members Al the HOO KQAC File	College or Call of College or Ca	PRINCIPAL ford College of Engineering mmanahalli, Hotur Road Bengaluru-550 065

Figure 1-5: List of IQAC members 2020-2021

## **Overview of Quality Audit:**

Quality Audit helps college / facility to:

- Understand the usage of electricity, water and other natural resources
- Identify opportunities to conserve various natural resources
- Identify various technological improvements
- Evaluate the techno-commercial of identified conservative measures
- Create awareness among the students and staff
- Disseminate the commitment of management towards saving nature
- Develop a culture among students, staff and management to be socially responsible

## 2. PRE – AUDIT PHASE

A Pre-audit meeting is a prerequisite for the audit, it helps to meet and discuss about the schedule and documents required during the audit. The pre-audit meeting was conducted at The Oxford College of Engineering. During the meeting, introduction of team members, scope and objectives of the audit were discussed.

## **Management Commitment**

The Management of the college has shown great commitment towards Quality Audit during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the Quality Auditing.

College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

## Scope and Goals of Quality Auditing

A clean and healthy environment aids effective learning and provides conducive learning environment. There are various efforts around the world to address environmental education issues. Quality auditing is one among them for educational institutions.

Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects.

This data will also provide a basis for calculating the economic benefits of resource conservation projects, by establishing the current rates of resource use and their associated costs. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self-audits.

## 3. **ON-SITE AUDIT PHASE**

## 3.1. Scope / Target Areas of Quality Auditing

## 3.1.1. Water Audit

Water Audit addresses water consumption, water sources, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

## 3.1.2. Energy Audit

Energy Audit addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability.

## 3.1.3. Waste Management Audit

Waste Audit addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

## 3.1.4. Green Campus Management Audit

Green campus initiatives are becoming an integral part of modern day's university systems. Green campus Audit helps in maintaining the air and water clean. It regulates the climatic conditions and provides a healthy and comfortable environment for living.

## 3.1.5. Environment Footprint Audit

Environment Footprint Audit addresses the usage of fossil fuels (coal, diesel, petrol and gas). The mode of commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels.

## 3.2. Audit Methodology and Approach

The methodology and approach adopted for the study involve various steps that include:

- Review of Document and records
- Review of Policies
- Review of MoU
- Review of various measures implemented
- Site Walkthrough
- Data Collection
- Interviews

## 3.2.1. Review of Document and Records

The various documents and records such as:

- o Electricity bills
- Water bills
- Equipment registers
- List of appliances
- o Internal Quality Audit document
- o Purchase document
- Cash payment receipts
- Equipment service report
- o Maintenance and service payment receipts

were reviewed and, relevant data and inputs required for analysis have been collected.

## 3.2.2. Review of Policies

College has various policies that include safety policy and Anti-ragging policy.

## A. Safety Policy:

All the students, teaching staff, non-teaching staff, maintenance and house-keeping staff have been given training to use fire extinguishers in emergency situations of fire and explosion. Fire hydrant system is available at the campus. Also, fire extinguishing cylinders have been installed in each floor and in laboratory areas. Fire order statements and use of fire extinguisher has been posted at each block. Fire alarm is also installed at the premises. Photos of fire order and fire alarm are shown in figure 3-1 and 3-2.







Figure 3-2: Fire alarm panel at engineering old block

## B. Anti-Ragging policy:

Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, hostel, sports, canteen, etc.) whether located within the campus or outside and in all means of transportation of students whether public or private. **'Say No to Ragging'** poster is placed in each block of the campus and a sample photo is as shown in the figure 3-3.



Figure 3-3: Anti-ragging poster

## 3.2.3. Review of various measures implemented

During the Quality Audit study, it was observed the college has taken various initiatives in conserving natural resources that include:

- Internal Quality Assurance Cell including Staff, Students, Alumni, parents and industrial members.
- Installation of Solar Roof Top Photo Voltaic (SRTPV) system for power generation.
- Wheeling to grid is done.
- Installation of LED fixtures to reduce electricity consumption
- Installation of LCD/LED monitors for all the desktops to conserve electricity
- Switching OFF lights and fans whenever not in use to save electricity
- Installation of RO plant to provide purified drinking water.
- Dual water piping system for washrooms and toilets, to use STP treated water for flushing
- Sewage treatment and using the treated final water for toilet flushing, gardening and cleaning purposes
- Rain water harvesting system is available in the campus.
- Regular testing of STP treated water quality parameters
- Dedicated watering system for greeneries.
- The use of sign boards in all the wash rooms were observed, to create awareness for water conservation
- Installation of waste segregation bins at all the rooms to separate the dry and wet waste
- Maintenance of logbooks and registers is done properly.
- Training is conducted on regular basis regarding usage of fire extinguisher, conservation of resources such as electricity, water, food and green campus.
- Maintenance team is available for electrical, plumbing, waste management and green campus management.

## 3.2.4. Site walk through

Site walk through was conducted with staff members, students and audit team members. Staff and students have shown very keen interest in the data collection process and methods to be followed in field data collection. The staff and students have given inputs and suggestions for resource conservation as well.

## **College Infrastructure**

The Oxford College of Engineering campus has various blocks and departments. Each floor has state of the art class rooms, staff rooms, laboratories, libraries and many more. Details of infrastructure are as follows:

- 0 Inhouse hostel for boys and girls
- o Bank facility
- o 24 hrs. atm in the campus
- o Solar plant
- o Rain water harvesting
- o RO water facility
- 0 Lifts & ramps
- o Cafeteria
- o Gymnasium
- o Cricket stadium / basketball court / badminton court
- Wi-Fi facility in the campus
- o CCTV security
- Telephone and fax facility
- o Photocopying facility
- The oxford enterprises (stationery)
- 0 Library

- 0 Digital library
- o Extended library hours
- o Hospital facility
- o Free dental treatment
- o First aid, medical and counseling facility
- 0 Scholarships
- o Group insurance
- 0 Placements
- o Placements training
- o English language coaching
- o Add-on courses
- o Cloud based ERP for students
- 0 Transport
- Parking facility
- o Cultural activities center
- o Incubation Centre for research activity
- o Staff room
- o Smart class rooms
- o Conference room
- o Student common room
- o Green campus

## 3.2.5. Inventory Collection

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, computers, projectors, printers, scanners etc., The consolidated list of inventories is given in table 3-1.

	Dept	Flore Tube	escent Light	LE	D	CFL	Fa	n	Cor	nputer	Exha	_	<b>D</b> · · ·	Xer	сс	ти	Desta		
S. No.		40 <del>v</del>	 MOR (36₩)	18₩ Tub e	12 ₩		Ceiling Fan	∀all moun tFan	LED /LCD Monito	CRT Monitors	ust Fans	ocan ners	ers	ox Mac hine	Came ra	Scre en	Proje ctor	AC	Refridg erator
1	AUTO ENGG	64	0	12	0	0	26	6	5	0	0	1	2	0	0	0	1	0	
2	BT	86	0	0	0	0	42	0	10	9	2	2	2	2	8	0	1	2	4
3	Chemistry	0	0	17	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
4	CSE	52	0	141	0	0	59	13	3	218	0	0	0	4	0	12	0	5	1
5	Civil	52	0	16	0	0	56	4	30	0	0	1	3	0	0	0	0	0	
6	ECE	81	0	0	0	0	44	11	48	0	3	0	4	0	7	0	3	1	
7	EEE	48	2	0	6	0	54	2	41	0	0	0	2	0	7	0	1	0	0
8	ISE	34	0	77	0	0	29	5	128	0	0	0	2	0	0	0	1	0	
9	Library	0	45	0	0	0	53	0	30	0	0	1	1	0	0	0	0	0	
10	Maths	16	0	0	0	0	14	1	5	0	0	0	7	0	0	0	0	0	
11	MBA	39	0	0	0	96	42	0	16	0	0	0	2	0	0	0	3	3	
12	MCA	51	0	0	0	0	31	0	242	0	0	0	2	0	3	0	0	9	
13	MECH	89	0	0	0	0	59	0	84	0	2	0	2	0	5	2	3	0	
14	MTE	24	0	0	0	0	19	0	3	0	0	0	1	0	4	0	1	0	
15	PHYSICS	39	0	0	0	0	27	1	2	0	0	0	1	0	6	0	0	0	
Tot	al (College)	675	47	263	6	96	567	43	647	227	7	5	31	6	40	14	14	20	5
То	tal(Hostel)	413	0	71	0	0	431	0	1	0	0	0	1	0	0	0	0	0	0
Tot	tal (Overall)	1088	47	334	6	96	998	43	648	227	7	5	32	6	40	14	14	20	5

Table 3-1: Consolidated list of inventories
#### 3.2.6. Interviews

To collect the various data, information and operating patterns, interviews were conducted with college staff (Principal, teaching staff, non-teaching staff) and students. The consolidated information from the interviews is given in the following sub-sections.

#### 3.2.6.1. List of Holidays:

The lists of holidays were collected during the study and the same is given below. The list of holidays for the year 2017 is shown in figure 3-4.

No.: CI	Ø: 3	te No. 40, 30 <sup>th</sup> Mi (Recognize 0410501/502, Fax	ain, 1" Phase, J.P. Nagar, Bangalore -560 078. d by Government of Karnataka) c: 30410569 E-mail: info@theoxford.cdu	
	ES/PAYROLL/	01/2016-17	Date: 06-01-201	
		NO	TIFICATION	
	Sub: Gener	al Holidays de	clared by the Government of Karnataka	
	for th	e Calendar Ye	ar 2017.	
Karnat Educa	The following i taka for the C tional Institution	s the list of h alendar Year ons also.	polidays declared by the Government of 2017 as applicable for all The Oxford	
SL.No	Date	Day	Occasion	
1.	14-01-2017	Saturday	Uttarayana Punya Kala Sankranti Festiva	
2.	26-01-2017	Thursday	Republic Day	
3.	24-02-2017	Friday	Maha Shivaratri	
4.	29-03-2017	Wednesday	Chandramana Ugadi	
5.	14-04-2017	Friday	Good Friday & Dr. B.R.Ambedkar Jayanthi	
6.	29-04-2017	Saturday	Basava Jayanthi	
7.	01-05-2017	Monday	May Day	
8.	26-06-2017	Monday	Kutub-E-Ramzan	
9.	15-08-2017	Tuesday	Independence day	
10.	25-08-2017	Friday	Varasiddhi Vinayaka Vrata	
11.	02-09-2017	Saturday	Balcrid	
12	19-09-2017	Tuesday	Mahalava Amavasye	
1.2.	29-09-2017	Friday	Maha Navami Ayudapooja	
13.	1 40 40 40 40 40 H H H	Saturday	Vijayadasami	
13.	30-09-2017	Monday	Gandhi Jayanthi	
13. 14. 15.	30-09-2017 02-10-2017	alonday	The second	
13. 14. 15. 16.	30-09-2017 02-10-2017 05-10-2017	Thursday	Maharshi Valmiki Jayanthi	
13. 14. 15. 16. 17.	30-09-2017 02-10-2017 05-10-2017 18-10-2017	Thursday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi	
13. 14. 15. 16. 17. 18.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017	Thursday Wednesday Friday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali	
13. 13. 14. 15. 16. 17. 18. 19.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017	Thursday Wednesday Friday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava	
12. 13. 14. 15. 16. 17. 18. 19. 20.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017	Thursday Wednesday Friday Wednesday Monday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi	
12. 13. 14. 15. 16. 17. 18. 19. 20. 21.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017 01-12-2017	Thursday Wednesday Friday Wednesday Monday Friday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi Id-Meelad	

Figure 3-4: List of Holidays-2017

Quality Audit Report of The Oxford College of Engineering, Bengaluru

#### The list of holidays for the year 2018 is shown in figure 3-5.

G	[Regn.No. 284/74-75] THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1 <sup>th</sup> Phase, J.P. Nagar, Bangalore -560 078 (Recognized by Government of Karnataka) ©: 30410501/502, Fax: 30410569 E-mail: info@theoxford.c			
	No.: C	ES/111/GH/2	2017-18 NO	Date: 12-12-2017 DTIFICATION
~		Sub: Gener for th	ral Holidays d ae Calendar Ye	eclared by the Government of Karnataka ear 2018.
	Govern The O	The following nment of Karn xford Educatio	is the list ataka for the nal Institution	of General Holidays declared by the Calendar Year 2018 as applicable for all s also.
	Sl.No	Date	Day	Occasion .
	1.	15-01-2018	Monday	Uttarayana Punya Kala/Sankranti Festiva
	2.	26-01-2018	Friday	Republic Day
	3.	13-02-2018	Tuesday	Maha Shivaratri
	4.	29-03-2018	Thursday	Mahaveera Jayanthi
	5.	30-03-2018	Friday	Good Friday
	6,	18-04-2018	Wednesday	Basaya Jayanthi
	7.	01-05-2018	Tuesday	May Day
	8.	16-06-2018	Saturday	Kutub-e-Ramzan
	9.	15-08-2018	Wednesday	Independence day
	10.	22-08-2018	Wednesday	Bakrid
	11.	13-09-2018	Thursday	Varasiddhi Vinayaka Vrata
	12.	21-09-2018	Friday	Last day of Moharam
	13.	02-10-2018	Tuesday	Gandhi Jayanthi
	14.	08-10-2018	Monday	Mahalaya Amayasye
	15.	18-10-2018	Thursday	Maha Navami, Ayudhapooja
	16.	19-10-2018	Friday	Vijavadashami
	17.	24-10-2018	Wednesday	Maharshi Valmiki Jayanthi
	18.	01-11-2018	Thursday	Kannada Raivosthava
	19.	06-11-2018	Tuesday	Naraka Chaturdashi
	20.	08-11-2018	Thursday	Balipadyami, Deepavali
	21.	21-11-2018	Wednesday	Id-Mcelad
	22.	26-11-2018	Monday	Kanakadasa Jayanthi
	23.	25-12-2018	Tuesday	Christmas Day
	on 18-	This list does to 03-2018 & 14- If any of the H	not include Ch 04-2018 fallin folidays for the	andramana Ugadi & Dr. Ambedkar Jayan g on Sundays respectively. e festivals of Muslim fraternity notified abo

shall be automatically applicable. Casual Leave or Earned Leave shall not be sanctioned in combination with any holidays.

-	1 2	SE
SNVL.	NARASIMHA	RAJU
	PRESIDENT	

To All the Heads of The Oxford Educational Institutions.

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Figure 3-5: List of Holidays-2018

The list of holidays for the year 2019 is shown in figure 3-6.



This list does not include Dr. Ambedkar Jayanthi, Maharshi Valmiki Jayanthi, Naraka Chathurdashi & Id-e-Milad which fall on 14-04-2019, 13-10-2019, 27-10-2019 and 10-11-2019 falling on Sundays respectively.

If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays.

1	- Lubba
SNVL.	NARASIMHA RAJU PRESIDENT

To

Figure 3-6: List of Holidays-2019

The list of holidays for the year 2020 is shown in figure 3-7.

G	CHILDREN'S EDUCATION SOCIETY (Regd.) (Regn.No. 254/74-75) THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1 <sup>st</sup> Phase, J.P. Nagar, Bangalore-560 078. (Recognized by Government of Karmataka) O: 30410501/502, Fax: 30410569 E-mail: info@uthewtond.edu			
12.0		111/68/201	9-20	Date: 01-01-2020
Person Pro-	10.1 CEO		N	DTIFICATION
	Su The S	b: General Ho for the Cal	lidays decla endar Year	ared by the Government of Karnataka 2020. eral Holidays declared by the Government of crail Holidays for all The Oxford Educational
Ka	mataka	for the Calend	ar Year 2020	as application for
ins	titutions	also.	Den	Occasion
	SLNo.	Date	Day	Littarayana Punya Kala/Makara Sankranti
and a second	V	15-01-2020	Wednesday	Maha Shivaratri
	V.	21-02-2020	Friday	Ueadi
	12	25-03-2020	Wednesday	Mahaveern Javanthi
	3	06-04-2020	Monday	Good Friday
	150	10-04-2020	Friday	Dr. BR Ambedkar Jayanthi
10.00	3.6.	14-04-2020	Tuesday	Man Day
	P.	01-05-2020	Friday	Party Day
-ditte.	0.8	25-05-2020	Monday	Retaid
· 200.	8	01-08-2020	Saturday	Jaking Jacob Day
	18.3	15-08-2020	Saturday	Canasha Chathurthi
a state of the second	- 11	22-08-2020	Saturday	Mahelava Amayasye
and in the second	18.	17-09-2020	Thursday	Mahathma Gandhi Jayanthi
1.1	13.	02-10-2020	Monday	Vilava Dhashami
1.1	X.	26-10-2020	Monday	M.c.Milad
1935000	10.	30-10-2020	Friday	Valmiki Javanthi
AL COURSE	16.	31-10-2020	Saturday	Naraka Chathurdashi
in. i	M.	14-11-2020	Manday	Balipadyami, Deepawali
is in	10.	16-11-2020	Thursday	Kanakadasa Jayanthi
	19.	03-12-2020	Eviday	Christmas
	This Mahanavi 26-04-203 If a nodified sutomatic	a list does not mi/Ayudha Po 20, 30-08-2020 ny of the Holis by notification cally applicable	include Rep oja and Kan , 25-10-2020 days for the of the Cow	ublic Day, Basava Jayanthi, Last Day of Monifa nada Rajyotsava falling on Sundays on 25-01-202 and 01-11-2020 respectively. festivals of Muslim fraternity notified above sta ernment of Karnataka, such notification shall
	i longi	and Leave or E	armed Leave	shall not be sanctioned for prefixing or suffixing
	Can any In	terrening work	ing days in co	ombination with holidays,
	or any m	Are serving when	Construction of the other	st.
				SNVL. MARASIMHA RAJU PRESIDENT
deres 1	To .		19000 100	an in the second
and the	All the He	cads of The Oxi	ord Education	nal Institutions.

Figure 3-7: List of Holidays-2020

The list of holidays for the year 2021 is shown in figure 3-8.



If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays

> SNVL NARASIMHA RAJU PRESIDENT

40

Figure 3-8: List of Holidays-2021

#### 3.2.6.2. Tentative Schedule of College

The tentative schedule of the college is 09.00 AM to 4:15 PM.

The library timing is 09:00 AM to 10:00 PM.

The details of the class sessions are given in table 3-2.

S. No.	Session	Timings
1	1 <sup>st</sup> Hour	09:00 TO 9:55AM
2	2 <sup>nd</sup> Hour	09:55 TO 10:50 AM
3	Short Break	10:50 TO 11:00 AM
4	3 <sup>rd</sup> Hour	11:00 TO 11:55 AM
5	4 <sup>th</sup> Hour	11:55 TO 12:50 PM
6	Lunch	12:50 TO 01:30 PM
7	5 <sup>th</sup> Hour	1:30 TO 2:25 PM
9	6 <sup>th</sup> Hour	2:25 TO 3:20 PM
10	7 <sup>th</sup> Hour	3:20 TO 4:15 PM

#### Table 3-2: Tentative College Schedule

#### 3.2.6.3. Staff and Students of College:

The number of staff including teaching, non-teaching, and house-keeping is given in the table 3-3. The number of students includes both boys and girls.

S. No.	Year	Teaching Staff	Non- Teaching staff	Total Staff	Total Students
1	2017	303	122	425	3572
2	2018	285	95	380	3044
3	2019	269	92	361	3124
4	2020	240	68	308	2728
5	2021	222	57	279	2722

#### Table 3-3: Number of staff and students

# 4. ENVIRONMENT AUDIT (CARBON FOOTPRINT ANALYSIS)

# 4.1. Facility Description

The carbon footprint is "the total amount of greenhouse gas (GHG) emissions caused by an organization, event or product". Global warming and climate change are the foremost environmental challenges facing the world today. It is our responsibility to minimize the consumption of energy and hence reduce the emissions of greenhouse gases.

To analysis the carbon footprint, transportation details of students and staff are collected as below:

- a. Number (or Percentage) of Staff using public transport: 39 %
- b. Number (or Percentage) of Staff using College transport: 10%
- c. Number (or Percentage) of Staff using Bike: 25%
- d. Number (or Percentage) of Staff using Car: 25%
- e. Number (or Percentage) of Staff using cycle: 1%
- f. Number of students using public transport: 38%
- g. Number of students using College transport: 10%
- h. Number of students using Bike: 50%
- i. Number of students using Car: 1%
- j. Number of students using cycle: 1%



The transportation details of staff are shown in figure 4-1.

Figure 4-1: Transportation details of staff



The transportation details of students are shown in figure 4-2.

Figure 4-2: Transportation details of students

# 4.2. Best Practices Implemented for Environment Conservation

# 4.2.1. Pedestrian Friendly Pathways

The institution had pedestrian friendly pathways where all staff & faculty can walk safely. Pedestrian friendly pathways are designed in such a way that there is no accidental intervention of vehicles on pathway of pedestrians. Platforms are available for pedestrians. Trees and streetlights are available in all roads inside the campus. Vehicle parking is available in front of engineering new block. The pedestrian friendly pathway is shown in figure 4-3.



Figure 4-3: Pedestrian friendly pathways with trees and streetlight

Quality Audit Report of The Oxford College of Engineering, Bengaluru



Figure 4-4: Platforms for pedestrians

# 4.2.2. Ramp facility for physically challenged persons

Wheelchair ramps enable physically challenged as well as elderly people to enjoy complete freedom, as they allow users to move in and around the campus safely. The ramp facility available at the campus is shown in figure 4-5.



Figure 4-5: Ramp facility for physically challenged

# 4.2.3. Awareness campaigns on environment conservation

#### Earth Day: Trees for the Earth!

The Oxford College of Engineering organized 'Earth Day: Trees for the Earth' on 22-4-2016 at The Oxford College of Science, HSR campus.

The event raised awareness among masses about climate change and global warming. Inspired to act towards the protection of the environment and focus on the need for conservation.

The effect of global warming on climate change and need of protecting the environment was explained during the event.

The image of the event is shown in figure 4-6.



Figure 4-6: Earth Day: Trees for the Earth! - 2016

### SWACHHTA HI SEVA 2019

The Oxford College of Engineering in association with NSS unit organized **SWACHHTA HI SEVA 2019 - Plastic Waste Free Campaign** at Garebhavipalya village. The event was conducted during 1<sup>st</sup> & 2<sup>nd</sup> October 2019.

The main objective of this program is to make people understand Plastic Waste Management, detrimental effect of uncollected plastic waste on human beings, animals and the environment.

The image during the event is shown in figure 4-7.



Figure 4-7: Plastic Waste Free Campaign - 2019

#### Plastic Awareness Campaign:

The Plastic Awareness Campaign, was carried out by the students and the faculties of the Department of Civil Engineering, The Oxford College of Engineering, in order to create awareness of the unnecessary use of plastic nowadays and how to utilize plastic in a fruitful manner. The campaign was conducted on **24.07.2021**.

The Waste will be the source of energy creation for future. Therefore, awareness was also brought about the corporation's, dry waste and wet waste segregation policy to the surrounding shop vendors, construction workers etc.

In this regard a possession was carried out with the posters displaying various slogans to the common people around.

The activity was carried out at the Garebhavipalya, service road stretch in the surrounding vicinity of our college campus.



The image of invitation for the event is shown in figure 4-8.

Figure 4-8: Plastic Awareness Campaign - Invitation

The sample image of students indulged in 'Plastic Awareness Campaign' at Garebhavipalya is shown in figure 4-9.



Figure 4-9: Plastic Awareness Campaign - at Garebhavipalya - 2021

#### Clean India Campaign:

The department of civil engineering in association with the NSS unit and Civil Engineering Students Technical Association Conducted a clean India Campaign in and around Bommanahalli, to cater the needs of the cleanliness in our daily lives.

The event was organized on **23-07-2021** on the Begur road, Bengaluru up to a certain stretch where importance of cleanliness was highlighted to the common public. This event bought a good response from the people and was a success.



The image of invitation for the event is shown in figure 4-10.

Figure 4-10: Clean India Campaign - Invitation

The sample image of students indulged in 'Clean India Campaign' at Bommanahalli is shown in figure 4-11.



Figure 4-11: Clean India Campaign - at Bommanahalli

#### Awareness on Impact of Sound Pollution:

An outreach programme on "Awareness on Impact of Sound Pollution" was organized by students of Department of MBA in association with NSS unit of The Oxford College of Engineering on 19<sup>th</sup> July 2021 at Hongasandra, Bangalore. 25 MBA Students have participated in the awareness campaign.

The programme created awareness among citizens of Bangalore regarding various problems due to Sound pollution.

The sample image of students indulged in 'Awareness on Impact of Sound Pollution' at Hongasandra is shown in figure 4-12.



Figure 4-12: Awareness on Impact of Sound Pollution-Hongasandra

## 4.2.4. Day-light Integration

During the audit phase classrooms, Staff-rooms, computer lab, seminar hall, UPS & batteries room and library areas were surveyed for illumination levels and fresh aircirculation. It was observed most of the rooms are well ventilated and day-light integrated; sample photos of daylight integration are shown in figure 4-13 and 4-14.



Figure 4-13: Day-light integration at Class room



Figure 4-14: Day-light integration at laboratory

The images of daylight integration at college premises are shown in figure 4-15 and 4-16.



Figure 4-15: Day-light integration at engineering old block



Figure 4-16: Day-light integration at engineering new block

# 4.2.5. Installation of LED lights

Many of the FTL in all the blocks of the campus are replaced with LED lights. LED tube lights are used in the class rooms, staff-rooms, corridors, hostel, dining area, street lighting and in labs. Sample photo of LED lamp used in the some of the locations of the college area are shown in figure 4-17 and 4-18.



Figure 4-17: Use of LED lights at engineering new block -office area

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Figure 4-18: Use of LED lights at engineering new block - at labs

The sample bill copy of LED tube light purchase is shown in figure 4-19.

660 al Contracting a der WARPPERSE CTRICALS & HARDWAR Dro. 0.46.0 2.1 100 India galuru, Karnataka ×g

Figure 4-19: LED tube light - Sample purchase bill

# 4.2.6. Installation of LED street lights

In college premises, LED street lights are installed all around the campus. The image of LED street light fixture is shown in figure 4-20.



Figure 4-20: Use of LED street lights

The sample bill copy of LED street light is shown in figure 4-21.



Figure 4-21: LED street light - Purchase bill

S.	Description	Unit	Values
No.			
1	Rated Wattage of LED street light installed	W	75
2	Quantity of LED street lights installed	Nos	64
3	Rated wattage if conventional fixtures used	W	100
4	Savings due to installation of one LED street light	W	25
5	Total savings (considering all LED street lights)	kW	1.6
6	Working hours per day	hours	12
7	No. of working days per year	days	365
8	Annual electricity savings	kWh	7008
9	Average electricity cost	Rs./kWh	9.18
10	Annual cost savings achieved per year	Rs. lakh/year	0.64
11	CO <sub>2</sub> mitigations per year	Tons/year	5.96

The cost savings due to existing LED street lights are given in table 4-1.

#### Table 4-1: Annual cost savings by installation of LED street lights

The cost savings due to existing 1x20 W LED fixtures are given in table 4-2.

S.	Description	Unit	Values
No.			
1	Rated Wattage of LED lamps installed	W	20
2	Quantity of LED lamps installed	Nos	263
3	Rated wattage of lamps used earlier	W	40
4	Savings per lamp by installation of LED lamps	W	20
5	Total savings	kW	5.26
6	Working hours per day	hours	9
7	No. of working days per year	days	250
8	Annual electricity savings	kWh	11835
9	Average electricity cost	Rs./kWh	9.18
10	Annual cost savings achieved per year	Rs. lakh/year	1.09
11	CO <sub>2</sub> mitigations per year	Tons/year	10.06

Table 4-2: Annual cost savings due to existing LED fixtures

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# 4.2.7. Installation of Solar Water Heater

Solar water heaters are installed at terrace of girl's hostel for to provide hot water supply. Three solar water heaters with capacity of 3 kL each is available. Sample photo of solar water heaters used in the hostel are shown in figure 4-22.



Figure 4-22: Girl's hostel – Solar Water Heater system

The cost savings by installation of solar water heaters of the campus are given in table 4-3.

S. No.	Description	Unit	Values
1	Solar water heater installed	L	9000
2	Total amount of heat produced	kCal/hr	270000
3	Electricity equivalent	kWh	314
4	No. of working days per year	days	250
5	Annual electricity savings	kWh	78488
6	Average electricity cost	Rs./kWh	9.18
7	Annual cost savings achieved per year	Rs. lakh/year	7.21
8	CO <sub>2</sub> mitigations per year	Tons/year	66.72

Table 4-3: Annual cost savings by solar water heater

## 4.2.8. Usage of LED/LCD monitors

LCD monitors are used for all the desktop computers in office, staff rooms and in labs. Sample photos of the LCD monitors used in labs are as shown in the figure 4-23.



Figure 4-23: Use of LED/LCD monitors in the computer labs

## 4.2.9. Rain Water Harvesting System

The rain water harvesting system is available in the campus. The schematic of rain water harvesting system is shown in figure 4-24.



Figure 4-24: Schematic of rain water harvesting

The rain water from terrace of the buildings are brought down through a dedicated pipeline to the rain water chambers. Then, from rain water chambers the rain water is sent to the rain water harvesting pits through underground pipeline. There are two rain water harvesting pits available. The sample image of pipeline for rain water from terrace of the engineering new block is shown in figure 4-25.



Figure 4-25: Pipeline for rain water from terrace

The rain water chamber is shown in figure 4-26.



Figure 4-26: Rain water chamber

The rain water harvesting pits are shown in figure 4-27 and 4-28. The pits are located near the STP area.



Figure 4-27: Rain water harvesting pit 1


Figure 4-28: Rain water harvesting pit 2

### 4.2.10. Sewage Water System

The sources of waste water in the college campus are as follows,

- o Washrooms
- o Toilets
- o Kitchen
- o Hostel
- o Labs
- o RO reject
- o Canteen

The schematic of Sewage Treatment Plant (STP) is shown in figure 4-29.



Figure 4-29: Schematic of STP

The capacity of the Sewage Treatment Plant (STP) is 300 kL per day. The STP is actually operated for 100 kL per day. Waste water from the college and hostel premises are collected and treated at sewage treatment plant.

The plumbing system (waste water collection, waste water transfer to STP, STP treated water storage and STP treated water to land scaping) is very well designed, the pipes are laid underground, and access / chambers are provided to regulate and control the flow of water.

The treated water from the STP is used for toilet flushing at engineering new block and girl's hostel. Treated STP water is supplied through a dedicated line for watering the garden. The STP area is shown in figure 4-30.



Figure 4-30: STP area

#### Sludge drying unit:

The sludge drying unit is established near STP collection tank. The sludge drying unit has six tanks in which the sludge is let to dry naturally. The water from the sludge is sent to collection tank. The dry sludge is then removed and decomposed. The decomposed sludge along with the dry plant waste is used as manure for trees and plant.

The sludge drying bed is shown in figure 4-31.



Figure 4-31: Sludge drying bed

The sludge decomposer pit is shown in figure 4-32.



Figure 4-32: Sludge decomposer pit

# 4.2.11. Dual piping system

Dual piping system is implemented in engineering new block and girl's hostel block.

# Engineering new block:

The treated STP water is used for toilet flushing in new engineering block. For this purpose, pneumatic pressure pump system is installed at the STP room. The STP water is connected through a dedicated pipeline for toilet flushing. Three pneumatic pumps are used to pump water for flushing line. Whenever flush button is pressed the pneumatic pumping system delivers water for flushing line.

The pneumatic pressure tank for dual piping system is shown in figure 4-33.



Figure 4-33: Pneumatic pressure tank for dual piping system

The pneumatic pressure pumps for dual piping system are shown in figure 4-34.



Figure 4-34: Pneumatic pressure pumps for dual piping system

The dual piping system flushing button is shown in figure 4-35.



Figure 4-35: Dual piping system - Flushing button

#### Girl's hostel block:

The toilets in girl's hostel have been provided with dual piping system. The dual piping system consists of raw water piping network and STP treated water piping network. The STP treated water is pumped to the overhead tank of girl's hostel. The capacity of pump is 10 HP. The overhead tank in girl's hostel is capable of storing 12 kL of STP treated water. The STP treated water is used for toilet flushing through a dedicated pipeline.

The pump used for pumping STP treated water to the girl's hostel overhead tank is shown in figure 4-36.



Figure 4-36: Pump for treated STP water

The flushing tank connected to dual piping system is shown in figure 4-37.



Figure 4-37: Dual piping system - Flushing tank

# 4.2.12. STP treated water for garden use

The treated STP water is used for watering the trees and garden. For this purpose, dedicated pipeline is provided. Taps are provided at various locations to facilitate the watering of garden.

The tap near STP area for providing STP treated water to garden is shown in figure 4-38.



Figure 4-38: STP treated water tap for garden use- near STP area

The tap near engineering new block for providing STP treated water to garden is shown in figure 4-39.



Figure 4-39: STP treated water tap for garden use- near engineering new block

The institution has installed STP with capacity of 300 kLPD and the quantity of STP water treated per day is 100 kL/Day. The quantity of water reused and cost savings per annum is given in table 4-4.

S. No.	Description	Unit	Values
1	STP capacity	kL/Day	300
2	Quantity of STP water treated per day	kL/Day	100
3	Assumed quantity of water reused @ 40% utilization factor	kL/Day	40
4	No. of working days per year	Days	250
5	Annual Quantity of water reused (saved)	kL/Annum	10000
6	Average water cost	Rs./Litre	0.086
7	Annual cost savings achieved	Rs. lakh/year	8.6

Table 4-4: Annual quantity of water reused and cost savings by installation of STP

# 4.3. Recommendations on Carbon Footprint Analysis

During the study, there was continuous interaction between the audit team, college engineers and staff members to ensure that the suggestions made are realistic, practical and implementable.

- Recommend staff to use car-pooling system
- Recommend students and staff to use public transport system
- Recommend students and staff to use bicycle
- Recommend staff and students to use electric vehicles
- Use of Display Boards to conserve fuel and the use of bicycle.
- Use of Digital Display is encouraged instead of plastic banners.

# 4.3.1. Replacement of conventional 1x40W FTL lamps with energy efficient 1x20W LED lamps

### Background

From the inventory data; collected during study it is observed conventional FTL lighting fixtures are used in the campus. The power consumed by FTL in comparison with LED fixtures is 50% higher. Replacing the existing FTL with LED will result in energy savings.

#### Recommendation

It is recommended to replace the existing 1x40W FTL lamps with 1x20W LED tube lights.

#### **Energy Savings**

#### Engineering New & old block:

The energy savings and investment cost for replacement of FTL with LED fixtures and its payback period are given in table 4-5. The total number of 1x40W FTL fixtures is 675.

S. No.	Description	Unit	Values
1	Total no. of 1x40W FTL	No.s	675
2	Power consumption by 1x40W FTL	kW	27
3	% of savings if all FTL replaced by LED fixtures	%	50
4	% of savings in kW if replaced by LED fixtures (Considering all fixtures)	kW	13.5
5	%of Lights found to be ON during working hours	%	50
6	Energy savings for fixtures in ON condition (4 x $5\%$ )	kW	6.75
7	Total working hours per day	hours	9.0
8	Annual savings (6 x 7 x <b>250days</b> )	kWh/Annum	15187.5
9	Average energy cost per kWh	Rs./kWh	9.18
10	Annual cost savings Rs. la		1.4
11	Cost of LED per fixture	Rs.	350.0
12	Total Investment cost for 675 LED fixtures	Rs.lakh	2.4
13	Simple payback period (12 / 10)	Years	1.69
14	CO <sub>2</sub> mitigations per year	Tons/year	12.91

# Table 4-5: FTL to LED replacement cost and payback period calculations -Engineering new & old block

# Hostel block

The energy savings and investment cost for replacement of FTL with LED fixtures and its payback period are given in table 4-6. The total number of 1x40W FTL fixtures is 413.

S. No.	Description	Unit	Values
1	Total no. of 1x40W FTL	No.s	413
2	Power consumption by 1x40W FTL	kW	16.52
3	% of savings if all FTL replaced by LED fixtures	%	50
4	% of savings in kW if replaced by LED fixtures (Considering all fixtures)	kW	8.26
5	%of Lights found to be ON during working hours	%	70
6	Energy savings for fixtures in ON condition (4 x $5\%$ )	kW	5.78
7	Total working hours per day	hours	8
8	Annual savings (6 x 7 x <b>250days</b> )	kWh/Annum	11564
9	Average energy cost per kWh	Rs./kWh	9.18
10	Annual cost savings	Rs. lakh	1.1
11	Cost of LED per fixture	Rs.	350
12	Total Investment cost for 675 LED fixtures	Rs.lakh	1.4
13	Simple payback period (12 / 10) Years		1.4
14	CO <sub>2</sub> mitigations per year Tons/year		9.83

# Table 4-6: FTL to LED replacement cost and payback period calculations-Hostel block

# 4.3.2. Aerator for taps

The aerator is a small attachment that either fits onto the end of the tap or can be inserted inside of the existing spout. These water saving devices will control the amount of water that flows through the tap without affecting the water pressure as they mix the water with air which will save water and money.

The aerators will separate a single flow of water into many tiny streams which introduces the air in to the water flow. Also, as there is less space for the water to flow through, the water flow is reduced, resulting in water savings. As the water pressure is maintained, most people don't notice a difference in the amount of water coming out of an aerated faucet yet benefit from the water efficiency.

Tap aerators are of most use to those with older taps which run on average around 15 litres of water per minute. Adding an aerator to an older tap can reduce this to as little as 6 litres of water per minute.

The biggest water saving benefit is achieved in the bathroom / hand wash / kitchen sinks where you are often turning the taps on and off to wash your hands and for other uses.

The aerator tap is shown in figure 4-40.



Figure 4-40: Aerators for taps

Tap aerators can save as much as up to half your water usage through this way. When you are using aerated water, you are unlikely to notice the difference except for saving water resulting in lower bills.

# 4.3.3. Waterless Urinals

Traditional water-based urinals are one of the major waters consuming area in any facility. Apart from the normal water usage, the cost for handling raw water to the urinals is an added expenditure. Also, maintaining the water taps and flushes for urinals will add to maintenance cost as well.

To overcome these challenges and as part of water conservation measure, implementation of waterless urinals can be incorporated in the campus.

Waterless urinals may look similar to regular flush urinals, but they use no water and have no flush valves. The sample image of waterless urinals is shown in figure 4-41.



Figure 4-41: Waterless urinals

The advantages of water less urinals are as follows:

- Saves water
- o Reduces water bill
- Reduces maintenance cost
- Reduces water handling cost (electricity cost for pumping raw water)
- Reduces usage of chemicals

Improves overall bathroom hygiene

# 5. ANNEXURES

# 5.1. Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

# 5.1.1. General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

# 1. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 5-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	Ι				
2	II				
3	III				

# Table 5-1: NAAC grading's Table

### 2. Internal Quality Audit Team: 2020 – 2021

Table 5-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

# Table 5-2: Internal Quality Audit team

# 3. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 5-3.

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S. No.	Description	Details	
1.	Name of the		
	College and		
	address:		
1.a	Head office		
	address :		
2.	Telephone/Fax		
	No		
3.	Co-ordinating	Name:	<u>^</u>
	officer:	Mob:	
		Email:	
4.	Year of		
	Establishment:		
5.	Hostel		
	(Available/Not		
	Available)		
6.	No. of Working		
	days/year		
7.	Brief description		
	of Campus		

# Table 5-3: General information of the college

## 4. College Infrastructure

Infrastructure details of the college were gathered from table 5-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

#### Table 5-4: Detail Infrastructure of the college

- 5. Details of Student clubs
- 6. Details of cells that support students
- 7. Tentative Schedule of a working day:
- a. No. of working days per year:
- b. List of holidays:
- 8. Total area of the campus
- 9. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 5-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

#### Table 5-5: Details of the departments

#### 10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 5-6

	Teaching Staff	Non-teaching	Support Staff (Security,
S. No.		Staff	House Keeping)

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Male	Female	Male	Female	Male	Female

#### Table 5-6: Details of the Staff

## 11. Number of Students

Number of students is collected from table 5-7.

S. No.	Boys	Girls
1		

#### Table 5-7: Details of the Students

#### 12. Additional infrastructure details have been collected from table 5-8.

S. No.	Description	Details
1.	Number of blocks available for boys hostel	Nos.
2.	Number of rooms available for boys hostel	Nos.
3.	Number of blocks available for girls hostel	Nos.
4.	Number of rooms available for girls hostel	Nos.
5.	Whether Laundry is available in the hostel	Yes / No
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron )	
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No
9.	Whether lifts available in academic block	Yes / No
10.	Whether Kitchen is available in the academic block	Yes / No
11.	Whether any food counter (outside caterers) available in academic block	Yes / No

12.	Whether any commercial shops available in	Yes / No	
	academic block		
13.	Any more information or additional details of		
	academic block you would like to share -		
	kindly elaborate here		

# Table 5-8: Details of the departments

# 5.1.2. Water Audit details:

#### 1. General information

General information required for water management analysis is collected from table 5-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	

S. No.	Description	Details
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well	
	water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

# Table 5-9: Water management details

#### 2. STP information

STP details are collected from table 5-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

### Table 5-10: Details of STP

## 3. RO Plant information

RO Plant details are obtained from table 5-11.

S. No.	Location	Quantity	Capacity
1.			
2.			

3.
----

Table 5-11: Details of RO Plant

# 5.1.3. Energy consumption details:

#### 1. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 5-12.

S. No.	Туре	Units		Value	Cost in Rs.
1	Electricity	kWh	2019		
			2020		
2	LPG	Cylinders			
3	Diesel	Litres (Mont	h wise		
		consumption	for		
		the last two y	ears)		
4	Others resources				
	(Please specify)				
5	Total connected load	kW			
6	Contract demand	kVA			
7	Maximum demand	kVA			
	recorded				
8	Average power factor				
9	Energy charges	Rs./kWh			
10	Demand charges	Rs./kVA			
	* Attach Electricity Bill Copy of last 2 years				

### Table 5-12: Details of Energy consumption

## 2. Solar Energy details:

The solar energy details required are collected from table 5-13.

S.	Buildin	Sol	ar water H	leater	So	olar PV Sys	stem
No	g No./	Capacit	Workin	Year of	Capacit	Workin	Year of
•	Name	у	g / Not	Installatio	у	g / Not	Installatio
			working	n		working	n

2				

#### Table 5-13: Details of Solar Energy

- 3. Solar Street lights details:
- a. Quantity -
- b. Capacity -
- c. Year of Installation -

# 4. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 5-14.

S. No.	Description	Details
1.	Number of Transformers Installed	Nos.
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No
4	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No
8	Whether Air Conditioning Units have been installed in the campus	Yes / No
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.
10.	Total number of computers available in the campus	Nos.
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.
12.	Whether water coolers are installed in the academic blocks	Yes/No

S. No.	Description	Details	
13.	Type of lamps (Fluorescent Tube Light, CFL, LED,	Nos.	
	Incandescent, Sodium / Mercury lamps, etc.,)		
	installed in the campus		
14.	Type of fans (ceiling, wall mount, standing, exhaust,	Nos.	
	etc.,) installed in the campus		
15.	Whether exhaust fans are installed in hostel /	Yes /No	
	kitchen.(If Yes, share the quantity and installed		
	location)		
16.	Any other electrical equipment's in college buildings.		

# Table 5-14: Details of Electrical Equipment

- 5. List of energy saving initiatives implemented
- 6. List of energy saving initiatives in plan for future

# 5.1.4. Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

# 1. Basic information

Basic information for waste management is collected from table 5-15.

S. No.	Description	Yes/ No
1	Whether wet and dry garbage segregation is done inside the	
	campus?	
2	Whether garbage is given to external agencies / municipal agencies?	

### Table 5-15: Basic details of waste management

# 2. Types of Waste generated

Types of waste generated in the college are obtained from table 5-16.

S. No.	Description		Remarks		
		No			
1	E-Waste (Computers, electrical and electronic parts)				
2	Hazardous / Chemical Waste				
3	Solid Waste (Damaged furniture, paper waste, paper plates)	Solid Waste (Damaged furniture, paper waste, paper			
4	Dry Leaves				
5	Food Waste				
6	Waste Water (Washing, urinals, bathrooms)				
7	Glass Waste (Broken glass wares from the labs)				
8	Unused Materials				
9	Plastic Waste (Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc.)				

### Table 5-16: Types of waste generated

### 3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 5-17.

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S. No.	Location	Bio- degradable	Non- Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

### Table 5-17: Segregation of waste

#### 4. Waste generation management

Waste generation management of the college was collected from table 5-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

### Table 5-18: Waste Disposal methods

# 5.1.5. Green campus management details:

### 1. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 5-19

S. No	Description Details		
1	Total number of plant species identified		
2	Total number of plants on the campus		
3	Total number of Trees on the campus		
4	Garden area inside the college –		
5	Total number of medicinal plants /trees on the campus		
6	Total number of vegetables and fruits plantation in the		
	campus		
7	Whether display boards are given to plants and trees for		
	identification		

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8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

#### Table 5-19: List of plantation details

# 2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 5-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 5-20: List of plants/trees in campus

# 5.1.6. Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 5-21.

S. No	Description	Details
1	Whether college provides transport facility for staff and students (Yes/No)	
2	Number (or Percentage) of staff using transport services provided by college	
3	Number (or Percentage) of students using transport services provided by college	
4	Number (or Percentage) of Staff using public transport	
5	Number (or Percentage) of Staff using Bike	
6	Number (or Percentage) of Staff using Car	
7	Number (or Percentage) of students using Public transport	
8	Number (or Percentage) of students using Car	
9	Number (or Percentage) of students using Bike	
10	Number (or Percentage) of students using Bicycles	
11	Average consumption of diesel per month	
12	Average electricity consumption per month	
13	Average LPG consumption per month	

# Table 5-21: Details of Carbon footprint management

# 5.1.7. Photos required for Audit:

# 1. General Photos

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 5-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

6	Photos of any other policies adopted by college		
	Photos	Drinking Water	
		STP processed water	
7	test	Bore-well water	
	report	Other water Sources (Like Tanker water and any	
	report	other)	
8	Photos of use of Energy efficient devices like fan, bulbs etc.		
9	Photos of LCD/LED monitors used in Labs		
10	Photos of dry and wet waste collection bins		
11	Photos of celebrating World Environment Day		
12	Photos of celebrating World Water Day		
13	Photos of celebrating World Earth Day		
14	Photos of	Photos of celebrating World Ozone Day	

Table 5-22: List of photos

# **QUALITY AUDIT REPORT**

# ON

# WASTE MANAGEMENT AUDIT

OF

# THE OXFORD COLLEGE OF ENGINEERING 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068

2016 -17 то 2020 -21



**ENHANCING RESOURCE EFFICIENCY**
## **QUALITY AUDIT REPORT**

## OF

# 'THE OXFORD COLLEGE OF ENGINEERING'

## 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



## © ECO ENERGIME ENGINEERS LLP

#### For More Information

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## **PROJECT ADVISOR**

- Mr. Prabu Das, M. Tech
- Ms. Aparna Reddy, B.Arch., MBA

### **ACKNOWLEDGEMENTS**

We are thankful to the management of **The Oxford College of Engineering**, **Bengaluru**, for the support, guidance and, giving us the opportunity to be involved in this very interesting and challenging assignment.

We would be happy to provide any further clarifications, if required, to facilitate the implementation of the recommendations.

We received full co-operation and support from the concerned personnel/ staff members of the college. We would like to thank:

Chairman – The Oxford Educational Institutions

The Oxford College of Engineering

And other Staff in personnel who have given full co-operation and support. They took a keen interest and gave valuable inputs during the course of study.



## EEELLP ACKNOWLEDGEMENT

EEELLP team thanks the management of **The Oxford College of Engineering, Bengaluru** for assigning this interesting work to us. We appreciate the co-operation extended to our team during the entire process.

Our special thanks are due to Principal & Team of colleagues for giving us necessary inputs to carry out this very vital exercise. We would like to thank all the head of the departments and staff members who were actively involved while collecting the data and conducting field measurements.

## DISCLAIMER

The Audit Team has prepared this report for The Oxford College of Engineering, Bengaluru based on the input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

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

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

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## **ABBREVIATION AND ACRONYMS**

1.	А	:	Amperes
2.	AC	:	Air Conditioner
3.	APFC	:	Automatic Power Factor Controller
4.	AMF	:	Automatic Mains Failure
5.	BBMP	:	Bruhat Bengaluru Mahanagara Palike
6.	BESCOM	:	Bangalore Electricity Supply Company
7.	BWSSB	:	Bangalore Water Supply and Sewerage Board
8.	CC Camera	:	Closed Circuit Camera
9.	DG	:	Diesel Generators
10.	EE Fan	:	Energy Efficient Fan
11.	E-Waste	:	Electronic Waste
12.	FTL	:	Fluorescent Tube Light
13.	GHG	:	Green House Gas
14.	Hz	:	Hertz
15.	HP	:	Horse Power
16.	ΗT	:	High Tension
17.	Ι	:	Current
18.	ICT	:	Information and Communications Technology
19.	IQAC	:	Internal Quality Assurance Cell
20.	ISO	:	International Organization for Standardization
21.	kgs	:	Kilograms
22.	kL	:	Kilo Liters
23.	kV	:	kilo volt
24.	kVA	:	kilo volt ampere
25.	kVAr	:	Reactive kilo volt ampere
26.	kW	:	Kilo Watt
27.	kWh	:	kilo Watt hour
28.	kWp	:	kilo Watt peak
29.	LCD	:	Liquid Crystal Display
30.	LED	:	Light Emitting Diode
31.	LT	:	Low Tension
32.	mA	:	Milli Amperes
33.	MoU	:	Memorandum of Understanding
34.	NA	:	Not Applicable
35.	NAAC	:	National Assessment and Accreditation Council
36.	NSS	:	National Service Scheme
37.	OHT	:	Over Head Tank
38.	Prim/Sec	:	Primary/Secondary
39.	PF	:	Power factor
40.	Ph.D.	:	Doctor of Philosophy

41.	PV	:	Photo Voltaic
42.	RCC	:	Reinforced Cement Concrete
43.	RO	:	Reverse Osmosis
44.	RR. No.	:	Revenue Register Number.
45.	Sq. Ft.	:	Square Feet
46.	Sq.m.	:	Square Meter
47.	SRTPV	:	Solar Roof Top Photo Voltaic
48.	TL	:	Tube Light
49.	TR	:	Ton of Refrigeration
50.	ΤV	:	Television
51.	V	:	Volts
52.	W	:	Watts
53.	Wi-Fi	:	Wireless Fidelity
54.	Wp	:	Watt peak
55.	#	:	Number

## **1. INTRODUCTION**

The Oxford College of Engineering was started in the year 2000, is one of the most prestigious institutions in Bengaluru that provides quality teaching and training in professional UG courses in 10 streams of Engineering in, Computer Science, AIML, Electronics and Communication, Electrical and Electronics, Mechanical, Civil, Bio-Technology, Mechatronics & Automobile. College also offers 10 Postgraduate programs in Technology (M. Tech), Computer Application (MCA) and Business Administration (MBA), and 11 Research centers recognized by VTU to offer Ph.D. programs. College is affiliated with the Visvesvaraya Technological University (VTU) and approved by the All-India Council for Technical Education (AICTE). The college also has been accredited by the NBA, and IAO quality-assessed organizations. The Institute name is also included in the NIRF & AICTE CII Survey of Industry Linked Technical Institute- 2020. Institution is categorized in Band promising in ARIIA ranking in the year 2021. The college is set in a sprawling 11.5 acres campus in the prestigious IT corridor, ideal for education in a serene environment with over 85,000 square meters of built-up area spread over 2 blocks, with enormous investment for academic purposes. The college has well equipped with state-ofthe-art infrastructure facilities to carry out various real-time projects, research, and consultancy activities in recent technologies. All the Departments have undertaken many research/consultancy projects funded both by multinationals and government agencies. The college has a good number of research publications in various reputed journals and patents. College has a good number of R&D projects sponsored by AICTE, VGST, VTU, IEEE, ICMR BRNS, NIF, NRB(DRDO) & BIRAC. It has a history of excellent placement track record in various multinational companies' offers with high salary packages.

#### VISION

To develop competent students with good value systems and face challenges of the continuously changing world.

#### MISSION

To be respected and most sought-after engineering educational institutions engaged in equipping individuals capable of building learning organizations in the new millennium.

#### **QUALITY POLICY**

To equip the students with highest standard of education, knowledge and ethics. To prepare them to meet the challenges of life with full confidence. Aim at all round development of the personality to be useful citizens.

#### Campus Area and Built-up area

The area of the campus (built up and total) area is given in table 1-1.

S. No. Description		Units	Details
1	Engineering Campus total area	Acres	11.5
2	Built up area	Sq. mt.	85,000

#### Table 1-1: College Area

#### **Committee and Cells**

The Oxford College of Engineering (TOCE) has various functional committees and cells. They are listed below,

- VTU/AICTE Committee
- o Planning & Accreditation Committee
- Library Committee
- Research and Development Committee
- o Training & Placement Committee
- o Faculty Development Committee
- o Purchase & Budget Committee
- o College Magazine/Calendar /Newsletter Committee
- o Professional Societies / Chapters
- o Cultural Association
- o Alumni Association

- o Sports Committee
- o NSS
- o Students Grievances Redressal Committee
- o Discipline Committee
- o Women's Grievance Redressal Committee
- o Anti-sexual Harassment Committee
- o Entrepreneurship & Incubation cell
- o Anti-Ragging Committee
- o Website, Server & Internet Committee
- o Public Relation Committee
- o Hostel & Canteen Committee
- o Prevention of Caste Based Discrimination Cell
- o College Internal Complaints Committee
- o Internal Task Force Team COVID 19 Coordination Committee
- o Internal Quality Assurance Cell (IQAC)
- o Exam Cell
- o Disability Recourse Centre
- o IPR Cell
- o IA Answer Scripts Evaluation Review Committee
- o IA Question Paper Scrutiny Committee

#### Internal Quality Assurance Cell (IQAC)

The college management constitutes the Internal Quality Assurance Cell including Principal, teaching faculty, non-teaching faculty, UG students (Male & Female), PG students (Male & Female), alumni, parent and industry representatives every year.

The list of Internal Quality Assurance Cell members for the academic year 2016-2017 is shown in figure 1-1.



#### Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2016

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SLNo Name of Member		Designation	Role
1.	Dr. Praveena Gowda	Principal	Chairperson
2.	Dr. Malleshalah T.S.	Professor, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs. Uma	Office Staff	Member – Non Teaching Faculty Representative
4.	Ms. Shilpa	ECE Student	Member – UG Female Student Representative
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student member Representative
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member – Alumni Representative
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative
11.	Dr. Mallikarjun K	Professor & Head Maths	Member - Coordinator
12.	Prof.Devi Vighneshwari	Asst. Prof in EEE	Joint Coordinator
	Copy to: 1. Chairman and Vice 2. Committee Membe 3. All the HOD's 4. IQAC File	Chairman	Principal & Chairperson IQAC PRINCIPAL e Oxford College of Engineering Bommanehal%, Hosur Road Bongaturu-550 068

Figure 1-1: List of IQAC members 2016-2017

The list of Internal Quality Assurance Cell members for the academic year 2017-2018 is shown in figure 1-2.



Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2017

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will er orders are issued. Following is the constitution of IQAC.

	De on sanc of Mamber	Designation	nore		
SI.No	Name of Member	Reference	Chairperson		
1.	Dr. Praveena Gowda	Professor, Dept. of Civil Eng.	Member -Teaching Faculty		
-	Dr. Malleshalah 1.3.	Office	Member - Non Teaching Faculty		
	Mrs. Uma	Staff	Member - UG Female Student		
4.	Ms. Shilpa	ECE Student	Representative		
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative		
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative		
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student memb Representative		
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker	Member – Alumni Representative		
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member – Parent Representative		
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative		
	De Mallibarius K	Professor & Head Maths	Member - Coordinator		
11.	Dr. Manikarjon K	Asst. Prof in EEE	Joint Coordinator		
14-	Prot.Devi viginiesittati		ANC		

Copy to: 1. Chairmanand Vice Chairman

4. IQAC File

2. Committee Members 3. All the HOD's



The Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-560 068

Figure 1-2: List of IQAC members 2017-2018

The list of Internal Quality Assurance Cell members for the academic year 2018-2019 is shown in figure 1-3.



#### Proceedings of the Principal and Chairperson IQAC

Order

#### Date: 27/07/2018

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SI.No	Name of Member	Designation	Role		
1.	Dr.Praveena Gowda	Principal	Chairperson		
2.	Dr. Malleshaiah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative		
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative		
4.	Ms.Ashmitha Dale Pais	CSE Student	Member – UG Female Student Representative		
5.	Mr.Vishal Nadig	EEE Student	Member – UG Male Student Representative		
6.	Ms.Dechekka K U	MBA Student	Member – PG Female Student Representative		
7.	Mr.Manoj P	MCA Student	Member – PG Male Student member Representative		
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative		
9.	Mr.C.Prakash Parent (of Male) Mr.B. B.M. Herna Maheshwar Parent (of Female)		Member -Parent Representative		
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative		
11	Dr. Mallikariun K	Professor& Head Maths	Member - Coordinator		
12	Prof Devi Viehoeshwari	Asst. Prof in EEE	Joint Coordinator		

#### Copy to:

1. Chairman and Vice Chairman

2. Committee Members

3. All the HOD's

4. IQAC File



Principal'& Chairperson IQAC PRINCIPAL Ine Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-550 068.

#### Figure 1-3: List of IQAC members 2018-2019

The list of Internal Quality Assurance Cell members for the academic year 2019-2020 is shown in figure 1-4.



Proceedings of the Principal and Chairperson IQAC Order

Date: 27/07/2019

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will governing body. These orders are issued. Following is the constitution of IQAC

	be on same until further o	Designation	Role			
1.No	Name of Member	Principal .	Chairperson			
1.	Dr.A.S.Aravind	Principal	Member -Teaching Faculty			
2.	Dr. Malleshalah T.S	Head, Dept. of Civil Eng.	Representative			
	Dr. Wateshearthy		Member - Non Teaching Faculty Representative			
3.	Mes Uma	Office Staff				
	The store is a store i		Member – UG Female Student			
4.	Ms Ashmitha Dale Pais	CSE Student	Representative			
			Member – UG Male Student Representative			
5.	Mr VishalNadig	EEE Student				
	Na. The start of t		Member - PG Female Student			
6.	Ata Duchakka KU	MBA Student	Representative			
	MS.Decretka H o		Member - PG Male Student			
7.	Mar Manol P	MCA Student	member Representative			
	Wir,manoj *	Cooler Collupte Engineer, Netcracker	Mambar - Alumni Representative			
8.	Mr Srinkas AS	Technologies Bangalore	Memoer - Addition representation			
	Ma Standar	Recent (of Male)	Member -Parent Representative			
9.	Mr.C.Prakash	Parent (of Female)				
	Mr.B.R.MHemaMaheshwar	Parent (or remain)				
10		General Manager, Power Train &	Member - Industry Representative			
10,	Mr.Shamin Dudu	Emobility, Robert BOSCH Engineering a	includer instantion inspection			
		Business Solutions Lto, Bangalore				
11.	Dr. Shashidhar	Professor & Head MCA	Member - Coordinator			
			Joint Coordinator			
12	Prof Devi Vighneshwari	Asst. Prof in EEE	and al al summer			

#### Copy to:

1. Chairmanand Vice Chairman

- 2. Committee Members
- 3. All the HOD's
- 4. IQAC File



#### Figure 1-4: List of IQAC members 2019-2020

The list of Internal Quality Assurance Cell members for the academic year 2020-2021 is shown in figure 1-5.





Proceedings of the Principal and Chairperson IQAC Order

Date:17/08/2020 By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Followides it the constitution of DOC

SI No.	Name of Member	Designation	Role
1.	Dr.A.S.Aravind	Principal	Chairperson
2.	Dr. Malleshalah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative
4,	Ms.Sahana H G	CSE Student	Member – UG Female Student Representative
5.	Mr.Dildar Bashir	EEE Student	Member – UG Male Student Representative
6.	Ms. Dhanyatha K	MBA Student	Member – PG Female Student Representative
7.	Mr.Anmol	MCA Student	Member – PG Male Student member Representative
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative
11.	Dr. Mallikarjun K	Professor& Head Maths	Member - Coordinator
12	Prof.Devi Vighneshwari	Asst. Prof In EEE	Joint Coordinator
Cop 1 2 1 4	y to: Chairman and Yoe Chairman Conneittee Members Al the HOO KQAC File	College or call of the On Bormanshall Hosur Road	PRINCIPAL ford College of Engineering mmanahalli, Hotur Road Bengaluru-550 065

Figure 1-5: List of IQAC members 2020-2021

#### **Overview of Quality Audit:**

Quality Audit helps college / facility to:

- Understand the usage of electricity, water and other natural resources
- Identify opportunities to conserve various natural resources
- Identify various technological improvements
- Evaluate the techno-commercial of identified conservative measures
- Create awareness among the students and staff
- Disseminate the commitment of management towards saving nature
- Develop a culture among students, staff and management to be socially responsible

## 2. PRE – AUDIT PHASE

A Pre-audit meeting is a prerequisite for the audit, it helps to meet and discuss about the schedule and documents required during the audit. The pre-audit meeting was conducted at The Oxford College of Engineering. During the meeting, introduction of team members, scope and objectives of the audit were discussed.

#### Management Commitment

The Management of the college has shown great commitment towards Quality Audit during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the Quality Auditing.

College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

#### Scope and Goals of Quality Auditing

A clean and healthy environment aids effective learning and provides conducive learning environment. There are various efforts around the world to address environmental education issues. Quality auditing is one among them for educational institutions.

Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects.

This data will also provide a basis for calculating the economic benefits of resource conservation projects, by establishing the current rates of resource use and their associated costs. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self-audits.

## 3. **ON-SITE AUDIT PHASE**

## 3.1. Scope / Target Areas of Quality Auditing

### 3.1.1. Water Audit

Water Audit addresses water consumption, water sources, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

### 3.1.2. Energy Audit

Energy Audit addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability.

### 3.1.3. Waste Management Audit

Waste Audit addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

### 3.1.4. Green Campus Management Audit

Green campus initiatives are becoming an integral part of modern day's university systems. Green campus Audit helps in maintaining the air and water clean. It regulates the climatic conditions and provides a healthy and comfortable environment for living.

### 3.1.5. Environment Footprint Audit

Environment Footprint Audit addresses the usage of fossil fuels (coal, diesel, petrol and gas). The mode of commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels.

## 3.2. Audit Methodology and Approach

The methodology and approach adopted for the study involve various steps that include:

- Review of Document and records
- Review of Policies
- Review of MoU
- Review of various measures implemented
- Site Walkthrough
- Data Collection
- Interviews

### 3.2.1. Review of Document and Records

The various documents and records such as:

- o Electricity bills
- Water bills
- o Equipment registers
- List of appliances
- o Internal Quality Audit document
- o Purchase document
- Cash payment receipts
- o Equipment service report
- o Maintenance and service payment receipts

were reviewed and, relevant data and inputs required for analysis have been collected.

#### 3.2.2. Review of Policies

College has various policies that include safety policy and Anti-ragging policy.

#### A. Safety Policy:

All the students, teaching staff, non-teaching staff, maintenance and house-keeping staff have been given training to use fire extinguishers in emergency situations of fire and explosion. Fire hydrant system is available at the campus. Also, fire extinguishing cylinders have been installed in each floor and in laboratory areas. Fire order statements and use of fire extinguisher has been posted at each block. Fire alarm is also installed at the premises. Photos of fire order and fire alarm are shown in figure 3-1 and 3-2.







Figure 3-2: Fire alarm panel at engineering old block

#### B. Anti-Ragging policy:

Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, hostel, sports, canteen, etc.) whether located within the campus or outside and in all means of transportation of students whether public or private. **'Say No to Ragging'** poster is placed in each block of the campus and a sample photo is as shown in the figure 3-3.



Figure 3-3: Anti-ragging poster

#### 3.2.3. Review of various measures implemented

During the Quality Audit study, it was observed the college has taken various initiatives in conserving natural resources that include:

- Internal Quality Assurance Cell including Staff, Students, Alumni, parents and industrial members.
- Installation of Solar Roof Top Photo Voltaic (SRTPV) system for power generation.
- Wheeling to grid is done.
- Installation of LED fixtures to reduce electricity consumption
- Installation of LCD/LED monitors for all the desktops to conserve electricity
- Switching OFF lights and fans whenever not in use to save electricity
- Installation of RO plant to provide purified drinking water.
- Dual water piping system for washrooms and toilets, to use STP treated water for flushing
- Sewage treatment and using the treated final water for toilet flushing, gardening and cleaning purposes
- Rain water harvesting system is available in the campus.
- Regular testing of STP treated water quality parameters
- Dedicated watering system for greeneries.
- The use of sign boards in all the wash rooms were observed, to create awareness for water conservation
- Installation of waste segregation bins at all the rooms to separate the dry and wet waste
- Maintenance of logbooks and registers is done properly.
- Training is conducted on regular basis regarding usage of fire extinguisher, conservation of resources such as electricity, water, food and green campus.
- Maintenance team is available for electrical, plumbing, waste management and green campus management.

#### 3.2.4. Site walk through

Site walk through was conducted with staff members, students and audit team members. Staff and students have shown very keen interest in the data collection process and methods to be followed in field data collection. The staff and students have given inputs and suggestions for resource conservation as well.

#### **College Infrastructure**

The Oxford College of Engineering campus has various blocks and departments. Each floor has state of the art class rooms, staff rooms, laboratories, libraries and many more. Details of infrastructure are as follows:

- 0 Inhouse hostel for boys and girls
- o Bank facility
- o 24 hrs. ATM in the campus
- o Solar plant
- o Rain water harvesting
- o RO water facility
- 0 Lifts & ramps
- o Cafeteria
- o Gymnasium
- o Cricket stadium / basketball court / badminton court
- Wi-Fi facility in the campus
- o CCTV security
- Telephone and fax facility
- o Photocopying facility
- The oxford enterprises (stationery)
- 0 Library

- 0 Digital library
- o Extended library hours
- o Hospital facility
- o Free dental treatment
- o First aid, medical and counseling facility
- 0 Scholarships
- o Group insurance
- 0 Placements
- o Placements training
- o English language coaching
- o Add-on courses
- o Cloud based ERP for students
- 0 Transport
- Parking facility
- o Cultural activities center
- o Incubation Centre for research activity
- o Staff room
- o Smart class rooms
- o Conference room
- o Student common room
- o Green campus

### 3.2.5. Inventory Collection

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, computers, projectors, printers, scanners etc., The consolidated list of inventories is given in table 3-1.

	Dept	Flore Tube	escent Light	LE	D	CFL	Fa	n	Cor	nputer	Exha e	_	<b>D</b> · · ·	Xer	сс	τν	<b>n</b> .		
S. No.		40 <del>V</del>	 MOR (36₩)	18₩ Tub e	12 ₩		Ceiling Fan	∀all moun tFan	LED /LCD Monito	CRT Monitors	ust Fans	ocan ners	ers	ox Mac hine	Came ra	Scre en	Proje ctor	AC	Refridg erator
1	AUTO ENGG	64	0	12	0	0	26	6	5	0	0	1	2	0	0	0	1	0	
2	BT	86	0	0	0	0	42	0	10	9	2	2	2	2	8	0	1	2	4
3	Chemistry	0	0	17	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
4	CSE	52	0	141	0	0	59	13	3	218	0	0	0	4	0	12	0	5	1
5	Civil	52	0	16	0	0	56	4	30	0	0	1	3	0	0	0	0	0	
6	ECE	81	0	0	0	0	44	11	48	0	3	0	4	0	7	0	3	1	
7	EEE	48	2	0	6	0	54	2	41	0	0	0	2	0	7	0	1	0	0
8	ISE	34	0	77	0	0	29	5	128	0	0	0	2	0	0	0	1	0	
9	Library	0	45	0	0	0	53	0	30	0	0	1	1	0	0	0	0	0	
10	Maths	16	0	0	0	0	14	1	5	0	0	0	7	0	0	0	0	0	
11	MBA	39	0	0	0	96	42	0	16	0	0	0	2	0	0	0	3	3	
12	MCA	51	0	0	0	0	31	0	242	0	0	0	2	0	3	0	0	9	
13	MECH	89	0	0	0	0	59	0	84	0	2	0	2	0	5	2	3	0	
14	MTE	24	0	0	0	0	19	0	3	0	0	0	1	0	4	0	1	0	
15	PHYSICS	39	0	0	0	0	27	1	2	0	0	0	1	0	6	0	0	0	
Tot	al (College)	675	47	263	6	96	567	43	647	227	7	5	31	6	40	14	14	20	5
То	tal(Hostel)	413	0	71	0	0	431	0	1	0	0	0	1	0	0	0	0	0	0
Tot	tal (Overall)	1088	47	334	6	96	998	43	648	227	7	5	32	6	40	14	14	20	5

Table 3-1: Consolidated list of inventories

#### 3.2.6. Interviews

To collect the various data, information and operating patterns, interviews were conducted with college staff (Principal, teaching staff, non-teaching staff) and students. The consolidated information from the interviews is given in the following sub-sections.

#### 3.2.6.1. List of Holidays:

The lists of holidays were collected during the study and the same is given below. The list of holidays for the year 2017 is shown in figure 3-4.

No.: CI	Ø: 3	(Regel No. 284/76-75) <b>OXFORD EDUCATIONAL INSTITUTIONS</b> te No. 40, 30 <sup>th</sup> Main, 1 <sup>st</sup> Phase, J.P. Nagar, Bangalore -560 078. (Recognized by Government of Karnataka) 0410501/502, Fax: 30410569 E-mail: info@theoxford.edu				
	ES/PAYROLL/	01/2016-17	Date: 06-01-201			
		NO	TIFICATION			
	Sub: Gener	al Holidays de	clared by the Government of Karnataka			
	for th	e Calendar Ye	ar 2017.			
Karnat Educa	The following i taka for the C tional Institution	s the list of h alendar Year ons also.	polidays declared by the Government of 2017 as applicable for all The Oxford			
SL.No	Date	Day	Occasion			
1.	14-01-2017	Saturday	Uttarayana Punya Kala Sankranti Festiva			
2.	26-01-2017	Thursday	Republic Day			
3.	24-02-2017	Friday	Maha Shivaratri			
4.	29-03-2017	Wednesday	Chandramana Ugadi			
5.	14-04-2017	Friday	Good Friday & Dr. B.R.Ambedkar Jayanthi			
6.	29-04-2017	Saturday	Basava Jayanthi			
7.	01-05-2017	Monday	May Day			
8.	26-06-2017	Monday	Kutub-E-Ramzan			
9.	15-08-2017	Tuesday	Independence day			
10.	25-08-2017	Friday	Varasiddhi Vinayaka Vrata			
11.	02-09-2017	Saturday	Bakrid			
12	19-09-2017	Tuesday	Mahalava Amavasye			
1.2.	29-09-2017	Friday	Maha Navami Ayudapooja			
13.	1 40 40 40 40 40 H H H	Saturday	Vijayadasami			
13.	30-09-2017	Monday	Gandhi Jayanthi			
13. 14. 15.	30-09-2017 02-10-2017	alonday	The second			
13. 14. 15. 16.	30-09-2017 02-10-2017 05-10-2017	Thursday	Maharshi Valmiki Jayanthi			
13. 14. 15. 16. 17.	30-09-2017 02-10-2017 05-10-2017 18-10-2017	Thursday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi			
13. 14. 15. 16. 17. 18.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017	Thursday Wednesday Friday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali			
13. 13. 14. 15. 16. 17. 18. 19.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017	Thursday Wednesday Friday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava			
12. 13. 14. 15. 16. 17. 18. 19. 20.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017	Thursday Wednesday Friday Wednesday Monday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi			
12. 13. 14. 15. 16. 17. 18. 19. 20. 21.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017 01-12-2017	Thursday Wednesday Friday Wednesday Monday Friday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi Id-Meelad			

Figure 3-4: List of Holidays-2017

#### The list of holidays for the year 2018 is shown in figure 3-5.

G		[Regn.No. 284/74-75] THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1 <sup>st</sup> Phase, J.P. Nagar, Bangalore -560 078. (Recognized by Government of Karnataka) ©: 30410501/502, Fax: 30410569 E-mail: info@theoxford.edu							
No.: CES/111/GH/2017-18 Date: 12-12 NOTIFICATION									
~	Sub: General Holidays declared by the Government of Karnataka for the Calendar Year 2018. The following is the list of General Holidays declared by the Government of Karnataka for the Calendar Year 2018 as applicable for all The Oxford Educational Institutions also.								
	Sl.No	Date	Day	Occasion .					
	1.	15-01-2018	Monday	Uttarayana Punya Kala/Sankranti Festiva					
	2.	26-01-2018	Friday	Republic Day					
	3.	13-02-2018	Tuesday	Maha Shivaratri					
	4.	29-03-2018	Thursday	Mahaveera Jayanthi					
	5.	30-03-2018	Friday	Good Friday					
	6,	18-04-2018	Wednesday	Basaya Jayanthi					
	7.	01-05-2018	Tuesday	May Day					
	8.	16-06-2018	Saturday	Kutub-e-Ramzan					
	9.	15-08-2018	Wednesday	Independence day					
	10.	22-08-2018	Wednesday	Bakrid					
	11.	13-09-2018	Thursday	Varasiddhi Vinayaka Vrata					
	12.	21-09-2018	Friday	Last day of Moharam					
	13.	02-10-2018	Tuesday	Gandhi Jayanthi					
	14.	08-10-2018	Monday	Mahalaya Amayasye					
	15.	18-10-2018	Thursday	Maha Navami, Ayudhapooja					
	16.	19-10-2018	Friday	Vijavadashami					
	17.	24-10-2018	Wednesday	Maharshi Valmiki Jayanthi					
	18.	01-11-2018	Thursday	Kannada Raivosthava					
	19.	06-11-2018	Tuesday	Naraka Chaturdashi					
	20.	08-11-2018	Thursday	Balipadyami, Deepavali					
	21.	21-11-2018	Wednesday	Id-Mcelad					
	22.	26-11-2018	Monday	Kanakadasa Jayanthi					
	23.	25-12-2018	Tuesday	Christmas Day					
	on 18-	This list does to 03-2018 & 14- If any of the H	not include Ch 04-2018 fallin folidays for the	andramana Ugadi & Dr. Ambedkar Jayan g on Sundays respectively. e festivals of Muslim fraternity notified abo					

shall be automatically applicable. Casual Leave or Earned Leave shall not be sanctioned in combination with any holidays.

-	1 2	SE
SNVL.	NARASIMHA	RAJU
	PRESIDENT	

To All the Heads of The Oxford Educational Institutions.

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Figure 3-5: List of Holidays-2018
The list of holidays for the year 2019 is shown in figure 3-6.



This list does not include Dr. Ambedkar Jayanthi, Maharshi Valmiki Jayanthi, Naraka Chathurdashi & Id-e-Milad which fall on 14-04-2019, 13-10-2019, 27-10-2019 and 10-11-2019 falling on Sundays respectively.

If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays.

1	- Lubba
SNVL.	NARASIMHA RAJU PRESIDENT

To

Figure 3-6: List of Holidays-2019

The list of holidays for the year 2020 is shown in figure 3-7.

G		THE	OXFORD Site No. 40, 30 (Reco) 30410501/502	S EDUCATION SOCIETY (Regd.) (kepn.No. 254/74-75) EDUCATIONAL INSTITUTIONS <sup>a</sup> Main, 1" Phase, J.P. Nagar, Bangalore-560 078. paized by Government of Karmataka) Fax: 30410569 E-mail: info@sheenford.edu
12.0		111/68/201	9-20	Date: 01-01-2020
Person Pro-	10.1 CEO		N	DTIFICATION
	Su The S	b: General Ho for the Cal	lidays decla endar Year	ared by the Government of Karnataka 2020. eral Holidays declared by the Government of crail Holidays for all The Oxford Educational
Ka	mataka	for the Calend	ar Year 2020	as application for
ins	titutions	also.	Den	Occasion
	SLNo.	Date	Day	Littarayana Punya Kala/Makara Sankranti
and a second	V	15-01-2020	Wednesday	Maha Shivaratri
	V.	21-02-2020	Friday	Ueadi
	12	25-03-2020	Wednesday	Mahaveern Javanthi
	3	06-04-2020	Monday	Good Friday
	150	10-04-2020	Friday	Dr. BR Ambedkar Jayanthi
10.00	3.6.	14-04-2020	Tuesday	Man Day
	P.	01-05-2020	Friday	Party Day
-ditte.	0.8	25-05-2020	Monday	Retaid
· 200.	8	01-08-2020	Saturday	Jaking Jacob Day
	18.2	15-08-2020	Saturday	Canasha Chathurthi
a state of the second	- 11	22-08-2020	Saturday	Mahelava Amayasye
and in the second	18.	17-09-2020	Thursday	Mahathma Gandhi Jayanthi
1.1	13.	02-10-2020	Monday	Vilava Dhashami
1.1	X.	26-10-2020	Monday	Id.e.Milad
1935000	10.	30-10-2020	Friday	Valmiki Javanthi
AL COURSE	16.	31-10-2020	Saturday	Naraka Chathurdashi
in. i	M.	14-11-2020	Manday	Balipadyami, Deepawali
is in	10.	16-11-2020	Thursday	Kanakadasa Jayanthi
	19.	03-12-2020	Eviday	Christmas
	This Mahanavi 16-04-203 If a nodified sutomatic	a list does not mi/Ayudha Po 20, 30-08-2020 ny of the Holis by notification cally applicable	include Rep oja and Kan , 25-10-2020 days for the of the Cow	ublic Day, Basava Jayanthi, Last Day of Monifa nada Rajyotsava falling on Sundays on 25-01-202 and 01-11-2020 respectively. festivals of Muslim fraternity notified above sta ernment of Karnataka, such notification shall
	i longi	and Leave or E	armed Leave	shall not be sanctioned for prefixing or suffixing
	Can any In	terrening work	ing days in co	ombination with holidays,
	or any m	Are serving when	Construction of the other	st.
				SNVL. MARASIMHA RAJU PRESIDENT
deres 1	To .		19000 100	an in the second
and the	All the He	cads of The Oxi	ord Educatio	nal Institutions.

Figure 3-7: List of Holidays-2020

The list of holidays for the year 2021 is shown in figure 3-8.



If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays

> SNVL NARASIMHA RAJU PRESIDENT

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Figure 3-8: List of Holidays-2021

#### 3.2.6.2. Tentative Schedule of College

The tentative schedule of the college is 09.00 AM to 4:15 PM.

The library timing is 09:00 AM to 10:00 PM.

The details of the class sessions are given in table 3-2.

S. No.	Session	Timings
1	1 <sup>st</sup> Hour	09:00 TO 9:55AM
2	2 <sup>nd</sup> Hour	09:55 TO 10:50 AM
3	Short Break	10:50 TO 11:00 AM
4	3 <sup>rd</sup> Hour	11:00 TO 11:55 AM
5	4 <sup>th</sup> Hour	11:55 TO 12:50 PM
6	Lunch	12:50 TO 01:30 PM
7	5 <sup>th</sup> Hour	1:30 TO 2:25 PM
9	6 <sup>th</sup> Hour	2:25 TO 3:20 PM
10	7 <sup>th</sup> Hour	3:20 TO 4:15 PM

#### Table 3-2: Tentative College Schedule

#### 3.2.6.3. Staff and Students of College:

The number of staff including teaching, non-teaching, and house-keeping is given in the table 3-3. The number of students includes both boys and girls.

S. No.	Year	Teaching Staff	Non- Teaching staff	Total Staff	Total Students
1	2017	303	122	425	3572
2	2018	285	95	380	3044
3	2019	269	92	361	3124
4	2020	240	68	308	2728
5	2021	222	57	279	2722

#### Table 3-3: Number of staff and students

Quality Audit Report of The Oxford College of Engineering, Bengaluru

# 4. WASTE MANAGEMENT AUDIT

The Institution has taken up various initiatives to maintain an environment friendly campus. The campus is full of greenery and is kept clean and tidy. The gardens, lawns and plantations inside the campus is maintained by a dedicated group of caretakers, sweepers and housekeeping staff. The Institution implements effective waste management through waste segregation and recycling of the waste.

## 4.1. Facility Description

The study involved carrying out various analyses to realistically assess waste generation. There are different types of waste generated in the college and is tabulated in table 4-1.

S. No.	Description	Yes / No	Details
1	E-Waste	Yes	External Agency
2	Hazardous / Chemical Waste	No	NA
3	Solid Waste	Yes	External Agency
4	Dry Leaves	Yes	Compost Unit
5	Food Waste	Yes	Organic Waste Digester
6	Waste Water	Yes	STP
7	Glass Waste	No	NA
8	Unused Materials	No	External Agency
10	Plastic Waste	Yes	External Agency

Table 4-1: Types of Waste Generated in the college

## 4.1.1. Dry Waste Management

The Institution implements solid waste management by enforcing the waste segregation rules. Solid waste includes both biodegradable and non-biodegradable components. The non-biodegradable solid waste generated in the campus include, paper, plastics, metal cans etc. Biodegradable waste includes food waste, vegetable peels, leaves etc.

Dustbins have been provided at designated locations in the campus. Housekeeping/sweepers are allotted to each floor who manage all the waste generated in the campus. All waste/garbage from college and hostel is collected, segregated and disposed of in a proper manner.

Wastes like old newspapers and records is sold to proper recycling agencies/vendors. There is no hazardous waste and radioactive waste is generated inside the campus.

Cleaning activities are carried out using chemicals wherever necessary.

The sample image of regular cleaning activity is shown in figure 4-1.



Figure 4-1: Regular cleaning activity of the college premises

### 4.1.2. Wet Waste Management

The food waste from the hostels / canteen are collected in separate bins. To collect food waste and used plates, trolley with waste bin is kept in dining hall of girl's hostel. The used plates are kept at trolley. Whereas, the food waste is disposed to the waste bin.

The image of trolley with waste bin at girl's hostel dining hall is shown in figure 4-2.



Figure 4-2: Trolley with waste bin

The waste bin kept at dining hall to dispose food waste is shown in figure 4-3.



Figure 4-3: Waste bin at dining hall

Food waste collected in girl's hostel block is shown in figure 4-4.



Figure 4-4: Food Waste at hostel mess

Vegetable waste from the kitchen is collected separately. Then it is kept at common disposal point behind the dining hall. The vegetable waste kept at disposal point is taken by BBMP personnel daily.

Sample image of vegetable waste kept is shown in figure 4-5.



Figure 4-5: Vegetable waste for disposal

## 4.1.3. Bio-Waste Management

Bio-medical waste includes discarded masks, napkins etc. Dustbins are placed at designated locations in the campus to collect bio-medical waste. Waste bins are provided in girl's restrooms and girl's hostel for disposing the used napkins. The waste bins kept near at girl's hostel restroom area is shown in figure 4-6.



Figure 4-6: Waste at girl's hostel restroom area

#### 4.1.4. Liquid- Waste Management

The Institution follows a systematic procedure for proper management and disposal of liquid waste. The waste water generated from the sanitary facilities is disposed through a dedicated waste water pipeline. The pipeline drains the waste water into the water chamber. Then, from waste water chamber, it is sent to sewage treatment plant through underground pipes.

The sources of waste water in the college campus are as follows,

- o Washrooms
- o Toilets
- o Kitchen
- o Hostel
- 0 Labs
- o RO reject
- o Canteen

The schematic of Sewage Treatment Plant (STP) is shown in figure 4-7.





34

The capacity of the Sewage Treatment Plant (STP) is 300 kL per day. The STP is actually operated for 100 kL per day. Waste water from the college and hostel premises are collected and treated at sewage treatment plant.

The plumbing system (waste water collection, waste water transfer to STP, STP treated water storage and STP treated water to land scaping) is very well designed, the pipes are laid underground, and access / chambers are provided to regulate and control the flow of water.

The treated water from the STP is used for toilet flushing at engineering new block and girl's hostel. Treated STP water is supplied through a dedicated line for watering the garden. The STP area is shown in figure 4-8.



Figure 4-8: STP area

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The STP collection tank is shown in figure 4-9.



Figure 4-9: STP -Collection tank

The aeration tank and clarifier are shown in figure 4-10.



Figure 4-10: Aeration tank

The clarifier section is shown in figure 4-11.



Figure 4-11: Clarifier section

The treated effluent tank is shown in figure 4-12.



Figure 4-12: Treated effluent tank

The filtering tank is shown in figure 4-13.



Figure 4-13: Filter and chemical dosing tank

The chemical dosing tank is shown in figure 4-14.

Figure 4-14: Chemical dosing tank

The final sump for storing treated water is shown in figure 4.15.



Figure 4-15: Final sump for treated STP water

#### 4.1.5. E - Waste Management

The Institution has undertaken a number of E-waste Management initiatives with the objective of creating an eco-friendly environment in the campus. E-waste such as computers and its peripherals are upgraded regularly to continue usage and to avoid its wastage.

E-wastes such as electronic components (plastic/metallic) are handed over to agencies which help recycle these materials.

E-waste generated in each department is listed and handed over to the facilities manager. Then, the e-waste is disposed through vendors.

The proforma for shifting of e-waste materials is shown in figure 4-16.

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Figure 4-16: Proforma for shifting of E – waste

## 4.2. Best Practices Implemented for Waste management

## 4.2.1. Sewage Treatment Plant for waste water recycling

The procedure for removing contaminants from the wastewater basically from the household sewage is called sewage treatment. It has to undergo the chemical, physical and biological procedure to remove these contaminants and give out an environmentally safe treated effluent. A semi-solid slurry called the sewage sludge is the by-product of the sewage treatment. This sludge is further processed before it is suitable for land application.

The institution has installed STP with capacity of 300 kLPD and the quantity of STP water treated per day is 100 kL/Day. The quantity of water reused and cost savings per annum is given in table 4-2.

S. No.	Description	Unit	Values
1	STP capacity	kL/Day	300
2	Quantity of STP water treated per day	kL/Day	100
3	Assumed quantity of water reused @ 40% utilization factor	kL/Day	40
4	No. of working days per year	Days	250
5	Annual Quantity of water reused (saved)	kL/Annum	10000
6	Average water cost	Rs./Litre	0.086
7	Annual cost savings achieved	Rs. lakh/year	8.6

Table 4-2: Annual quantity of water reused and cost savings by installation of STP

## 4.2.2. Usage of STP water for toilet flushing

#### Engineering New Block:

The treated STP water is used for toilet flushing in new engineering block. For this purpose, pneumatic pressure pump system is installed at the STP room. The STP water is connected through a dedicated pipeline for toilet flushing. Three pneumatic pumps are used to pump water for flushing line. Whenever flush button is pressed the pneumatic pumping system delivers water for flushing line. The pneumatic pressure tank for dual piping system is shown in figure 4-17.



Figure 4-17: Pneumatic pressure tank for dual piping system

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The pneumatic pressure pumps for dual piping system are shown in figure 4-18.



Figure 4-18: Pneumatic pressure pumps for dual piping system

The dual piping system flushing button is shown in figure 4-19.



Figure 4-19: Dual piping system - Flushing button

#### Girl's hostel block:

The toilets in girl's hostel have been provided with dual piping system. The dual piping system consists of raw water piping network and STP treated water piping network. The STP treated water is pumped to the overhead tank of girl's hostel. The capacity of pump is 10 HP. The overhead tank in girl's hostel is capable of storing 12 kL of STP treated water. The STP treated water is used for toilet flushing through a dedicated pipeline.

The pump used for pumping STP treated water to the girl's hostel overhead tank is shown in figure 4-20.



Figure 4-20: Pump for treated STP water

The flushing tank connected to dual piping system is shown in figure 4-21.



Figure 4-21: Dual piping system - Flushing tank

## 4.2.3. STP treated water for garden use

The treated STP water is used for watering the trees and garden. For this purpose, dedicated pipeline is provided. Taps are provided at various locations to facilitate the watering of garden.

The tap near STP area for providing STP treated water to garden is shown in figure 4-22.



Figure 4-22: STP treated water tap for garden use- near STP area

The tap near engineering new block for providing STP treated water to garden is shown in figure 4-23.



Figure 4-23: STP treated water tap for garden use - near engineering new block

#### 4.2.4. Waste collection bins

To maintain the college premises clean & hygiene, waste collection bins are kept at appropriate locations i.e., office, staff rooms, class rooms, laboratories, corridors, rest rooms, canteen and campus area. The cleaning activity is carried out routinely.

The waste from all waste collection bins is collected by housekeeping staff. Then, it is segregated and kept at waste disposal point. From waste disposal point the segregated waste is collected by the BBMP vehicle. The image of waste collection bin kept at class room is shown in figure 4-24.



Figure 4-24: Waste bin at class room

The image of waste collection bin kept near boy's rest room is shown in figure 4-25.



Figure 4-25: Waste bin at boy's rest room

At girl's hostel block, waste collection bins are kept near entrance of each room. The sample image is shown in figure 4-26.



Figure 4-26: Waste bin at girl's hostel

The sample image of larger waste bins kept at corridors of each floor in girl's hostel is shown in figure 4-27.



Figure 4-27: Larger waste bins at girl's hostel corridor

The images of waste collection bins kept all around the campus are shown in figure 4-28 and 4-29.



Figure 4-28: Waste bins near girl's hostel


Figure 4-29: Waste bins near engineering old block

# 4.2.5. Regular purchase of housekeeping materials

To keep the college campus clean and hygiene, the housekeeping materials like scrub, allpurpose cleaner spray, phenyls, acids, mops, garbage bags, chemical disinfectants, broom sticks, and waste bins are purchased regularly.

The purchased housekeeping materials are distributed to housekeeping staffs to carry out the cleaning activity.

The sample bill for purchase of housekeeping materials for the year 2017 is shown in figure 4-30.

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Figure 4-30: Sample housekeeping material purchase bill -2017

The sample bill for purchase of housekeeping materials for the year 2018 is shown in figure 4-31.



Figure 4-31: Sample housekeeping material purchase bill -2018

The sample bill for purchase of housekeeping materials for the year 2019 is shown in figure 4-32.

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Figure 4-32: Sample housekeeping material purchase bill -2019

The sample bill for purchase of housekeeping materials for the year 2020 is shown in figure 4-33.

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Figure 4-33: Sample housekeeping material purchase bill -2020

The sample bill for purchase of housekeeping materials for the year 2021 is shown in figure 4-34.

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Figure 4-34: Sample housekeeping material purchase bill -2021

The sample image of procured housekeeping materials like mops and mop sticks for engineering blocks is shown in figure 4-35 and figure 4-36.



Figure 4-35: Mops - For Engineering blocks



Figure 4-36: Mop sticks - For Engineering blocks

The sample image of procured housekeeping materials like phenyls and acids for engineering blocks is shown in figure 4-37.



Figure 4-37: Phenyls and acids -For engineering blocks

The sample image of procured housekeeping materials i.e., disinfectants for girl's hostel block is shown in figure 4-38.



Figure 4-38: Disinfectants for girl's hostel block

The sample image of procured housekeeping materials i.e., scrub, glass cleaner for girl's hostel block is shown in figure 4-39.



Figure 4-39: Scrub and glass cleaners for girl's hostel block

# Garbage lifting expenses:

The sample bill for lifting of garbage for the year 2017 is shown in figure 4-40.

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Figure 4-40: Sample bill for lifting garbage - 2017

69

The sample bill for lifting of garbage for the year 2018 is shown in figure 4-41.

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Figure 4-41: Sample bill for lifting garbage - 2018

The sample bill for lifting of garbage for the year 2019 is shown in figure 4-42.

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Figure 4-42: Sample bill for lifting garbage - 2019

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The sample bill for lifting of garbage for the year 2020 is shown in figure 4-43.

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Figure 4-43: Sample bill for lifting garbage - 2020

The sample bill for lifting of garbage for the year 2021 is shown in figure 4-44.

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Figure 4-44: Sample bill for lifting garbage - 2021

# 4.2.6. Waste Segregation

The waste collected from the college premises are segregated and kept at waste disposal point. The wastes are segregated as plastic waste, PET bottle waste, paper waste, food waste and vegetable waste.

The image of plastic wrapper waste kept at waste disposal point is shown in figure 4-45.



Figure 4-45: Segregated plastic waste

The image of PET bottle waste kept at waste disposal point is shown in figure 4-46.



Figure 4-46: Segregated PET bottle waste

# 4.2.7. Sludge waste as manure

The sludge drying unit is established near STP collection tank. The sludge drying unit has six tanks in which the sludge is let to dry naturally. The water from the sludge is sent to collection tank. The dry sludge waste is then removed and decomposed. The decomposed sludge along with the dry plant waste is used as manure for trees and plant.

The sludge waste drying bed is shown in figure 4-47.



Figure 4-47: Sludge waste drying bed

The sludge decomposer pit is shown in figure 4-48.



Figure 4-48: Sludge waste decomposer pit

# 4.2.8. Use of steel cutleries at hostel

To reduce the usage of plastic, re-usable steel cutleries are being used at college hostel and canteen.

The sample image of steel cutleries used at hostel is shown in figure 4-49.



Figure 4-49: Steel cutleries at hostel

# 4.2.9. Awareness program

#### **Decomposition Awareness Program:**

A program titled 'Decomposition Awareness Program' was organized by the NSS volunteers of TOCE at Karnataka Rajya Vignana Parisath on **05.06.2017**.

The volunteers have successfully provided the information, to have awareness, help people and professionals, for making best practices for a wide range of conditions, including:

- Garbage Harvesting
- Save and clean the earth
- How to make society clean with garbage

The sample images taken during the program is shown in figure 4-50.



Figure 4-50: Decomposition Awareness Program

# Clean the Environment event:

The Oxford College of Engineering in association with NSS unit has organized **"SWACHATHA ANDOLAN" (Clean the Environment)** event at Mangammanapalya village on 6/2/2018.

**'Swachatha Andolan'** is a country-wide campaign initiated by the Government of India in 2014 to eliminate open defecation and improve solid waste management in surrounding environment.

The image taken during the event is shown in figure 4-51.



Figure 4-51: Clean the Environment - at Mangammanapalya village

## Waste Management Awareness Programme-2019

Waste management awareness program was conducted on 16.06.2019 at Garebhavipalya village. During the program, students were highlighting the importance of managing house hold waste effectively. Students awakened the people about the need of Reduce, Reuse and Recycle of waste.

Students have explained about following factors

- Single Stream Recycling.
- Commercial Recycling.
- Organic and Food Waste Recovery.
- Multi-family Recycling.
- Away from Home and Special Event Recycling.
- Waste Awareness and 'How to Recycle' Communications.

The image taken during the program is shown in figure 4-52.



Figure 4-52: Students indulged in Waste Management awareness program-2019

#### Waste Management Awareness Programme-2021

An outreach programme on "Waste Management Awareness Programme" was organized by 6th semester students of Department of CSE on 17th July 2021 at JP Nagar 7th phase BOB colony Bangalore. The main aim of this awareness programme is to create awareness about the importance of waste management to maximum number of people for proper management of waste as it is important for building sustainable and livable cities.

The awareness programme successfully managed to engage the community and the students visited different places, residential of that area and heavily populated areas to educate people on importance of managing the waste such as Recycling, Re-use, and not but the garbage waste.

The invitation for the event is shown in figure 4-53.



Figure 4-53: Waste Management awareness program - Invitation

The image taken during the event is shown in figure 4-54.



Figure 4-54: Students involved in Waste Management awareness program-2021

# SWACHH BHARAT – GO GREEN INITIATIVE:

The Department of Mechanical engineering, carried out the awareness program on SWACHH BHARAT – GO GREEN INITIATIVE on **26.07.2021.** The initiative focused on bringing awareness about the importance of growing plants and keeping our surroundings clean and healthy.

The image of invitation for the event is shown in figure 4-55.



Figure 4-55: Swachh Bharat - Go Green Initiative - Invitation

The image of Students indulged in SWACHH BHARATH initiative is shown in figure 4-56.



Figure 4-56: Students Participation in Swachh Bharath initiative - 2021

# 4.2.10. Maintenance team

The housekeeping staff carry out the waste management process at college premises. The name list of housekeeping staff is given in table 4-3.

S. No.	Block	Name of the housekeeping staff
1		Smt. Mahalakshmi
2		Smt. Vaddi Padmavathi
3	<b>F</b>	Smt. Mahalakshimma
4	Engineering	Smt. Shanthamma
5	new block	Smt. Arogya Mary
6		Smt. Munithyamma
7		Smt. Jothi
1		Smt. Sarojamma
2	Engineering	Smt. Amala
3	OIG DIOCK	Mr. Kumara swamy
1		Smt. Asha
2		Smt. Ambika
3	llestel	Smt. Andalamma
4	block	Smt. Manjula
5		Smt. Vasantha
6		Smt. Gowaramma
7		Smt. Venkataramanamma

Table 4-3: Maintenance team - Waste management

# 4.3. Recommendations on Waste Management Audit

# 4.3.1. Color Code Bins

Different color code bins for the waste segregation (Dry, Wet, Bio-medical/Sanitary) at the source itself will make the segregation easy and hence it is recommended to place standard color code bins at all waste collection points of the campus.

# 4.3.2. Posters on Plastic Ban

Different posters on 'Plastic Ban' can be placed in and around the blocks of the campus. So that the students, staff and trespassers are aware of the college is Plastic Free zone.

# 4.3.3. Usage of awareness signboards

Use of more sign boards to create awareness for better waste management like 'Plastic ban', 'Do not litter', 'Think clean and use dustbin' etc., shall be placed at appropriate locations.

# 4.3.4. Installation of leaf composter

The dry leaves can be collected separately and disposed in the leaf composter. A large landscape with many types of trees will need leaf composters to ensure that no garden clippings and leaves leave the site. Gardeners value leaf compost highly for use in lawns. It saves expense on external fertiliser for the garden and increases biodiversity in the garden and landscaped area.

# 5. ANNEXURES

# 5.1. Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

# 5.1.1. General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

## 1. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 5-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	Ι				
2	II				
3	III				

## Table 5-1: NAAC grading's Table

#### 2. Internal Quality Audit Team: 2020 – 2021

Table 5-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

#### Table 5-2: Internal Quality Audit team

#### 3. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 5-3.

88

S. No.	Description	Details	
1.	Name of the		
	College and		
	address:		
1.a	Head office		
	address :		
2.	Telephone/Fax		
	No		
3.	Co-ordinating	Name:	<u>^</u>
	officer:	Mob:	
		Email:	
4.	Year of		
	Establishment:		
5.	Hostel		
	(Available/Not		
	Available)		
6.	No. of Working		
	days/year		
7.	Brief description		
	of Campus		

# Table 5-3: General information of the college

## 4. College Infrastructure

Infrastructure details of the college were gathered from table 5-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

#### Table 5-4: Detail Infrastructure of the college

- 5. Details of Student clubs
- 6. Details of cells that support students
- 7. Tentative Schedule of a working day:
- a. No. of working days per year:
- b. List of holidays:
- 8. Total area of the campus
- 9. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 5-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

#### Table 5-5: Details of the departments

#### 10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 5-6

	Teaching Staff	Non-teaching	Support Staff (Security,
S. No.		Staff	House Keeping)

90

Male	Female	Male	Female	Male	Female

#### Table 5-6: Details of the Staff

## 11. Number of Students

Number of students is collected from table 5-7.

S. No.	Boys	Girls
1		

#### Table 5-7: Details of the Students

#### 12. Additional infrastructure details have been collected from table 5-8.

S. No.	Description	Details
1.	Number of blocks available for boys hostel	Nos.
2.	Number of rooms available for boys hostel	Nos.
3.	Number of blocks available for girls hostel	Nos.
4.	Number of rooms available for girls hostel	Nos.
5.	Whether Laundry is available in the hostel	Yes / No
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron )	
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No
9.	Whether lifts available in academic block	Yes / No
10.	Whether Kitchen is available in the academic block	Yes / No
11.	Whether any food counter (outside caterers) available in academic block	Yes / No

12.	Whether any commercial shops available in	Yes / No	
	academic block		
13.	Any more information or additional details of		
	academic block you would like to share -		
	kindly elaborate here		

# Table 5-8: Details of the departments

# 5.1.2. Water Audit details:

#### 1. General information

General information required for water management analysis is collected from table 5-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	

S. No.	Description	Details
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well	
	water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

# Table 5-9: Water management details

#### 2. STP information

STP details are collected from table 5-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

### Table 5-10: Details of STP

# 3. RO Plant information

RO Plant details are obtained from table 5-11.

S. No.	Location	Quantity	Capacity
1.			
2.			
3.			
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Table 5-11: Details of RO Plant

# 5.1.3. Energy consumption details:

### 1. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 5-12.

S. No.	Туре	Units		Value	Cost in Rs.
1	Electricity	kWh	2019		
			2020		
2	LPG	Cylinders			
3	Diesel	Litres (Mont	h wise		
		consumption for			
		the last two years)			
4	Others resources				
	(Please specify)				
5	Total connected load	kW			
6	Contract demand	kVA			
7	Maximum demand	kVA			
	recorded				
8	Average power factor				
9	Energy charges	Rs./kWh			
10	Demand charges	Rs./kVA			
	* Attach Electricity Bill Copy of last 2 years				

## Table 5-12: Details of Energy consumption

# 2. Solar Energy details:

The solar energy details required are collected from table 5-13.

S.	Buildin	Sol	ar water H	leater	So	olar PV Sys	stem
No	g No./	Capacit	Workin	Year of	Capacit	Workin	Year of
•	Name	у	g / Not	Installatio	у	g / Not	Installatio
			working	n		working	n

2				

#### Table 5-13: Details of Solar Energy

- 3. Solar Street lights details:
- a. Quantity -
- b. Capacity -
- c. Year of Installation -

# 4. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 5-14.

S. No.	Description	Details
1.	Number of Transformers Installed	Nos.
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No
4	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No
8	Whether Air Conditioning Units have been installed in the campus	Yes / No
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.
10.	Total number of computers available in the campus	Nos.
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.
12.	Whether water coolers are installed in the academic blocks	Yes/No

S. No.	Description	Details	
13.	Type of lamps (Fluorescent Tube Light, CFL, LED,	Nos.	
	Incandescent, Sodium / Mercury lamps, etc.,)		
	installed in the campus		
14.	Type of fans (ceiling, wall mount, standing, exhaust,	Nos.	
	etc.,) installed in the campus		
15.	Whether exhaust fans are installed in hostel /	Yes /No	
	kitchen.(If Yes, share the quantity and installed		
	location)		
16.	Any other electrical equipment's in college buildings.		

# Table 5-14: Details of Electrical Equipment

- 5. List of energy saving initiatives implemented
- 6. List of energy saving initiatives in plan for future

# 5.1.4. Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

# 1. Basic information

Basic information for waste management is collected from table 5-15.

S. No.	Description	Yes/ No
1	Whether wet and dry garbage segregation is done inside the	
	campus?	
2	Whether garbage is given to external agencies / municipal agencies?	

## Table 5-15: Basic details of waste management

# 2. Types of Waste generated

Types of waste generated in the college are obtained from table 5-16.

S. No.	Description	Yes /	Remarks
		No	
1	E-Waste (Computers, electrical and electronic parts)		
2	Hazardous / Chemical Waste		
3	Solid Waste (Damaged furniture, paper waste, paper plates)		
4	Dry Leaves		
5	Food Waste		
6	Waste Water (Washing, urinals, bathrooms)		
7	Glass Waste (Broken glass wares from the labs)		
8	Unused Materials		
9	Plastic Waste (Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc.)		

## Table 5-16: Types of waste generated

## 3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 5-17.

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S. No.	Location	Bio- degradable	Non- Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

## Table 5-17: Segregation of waste

### 4. Waste generation management

Waste generation management of the college was collected from table 5-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

## Table 5-18: Waste Disposal methods

# 5.1.5. Green campus management details:

## 1. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 5-19

S. No	Description	Details
1	Total number of plant species identified	
2	Total number of plants on the campus	
3	Total number of Trees on the campus	
4	Garden area inside the college –	
5	Total number of medicinal plants /trees on the campus	
6	Total number of vegetables and fruits plantation in the	
	campus	
7	Whether display boards are given to plants and trees for	
	identification	

8

Quality Audit Report of The Oxford College of Engineering, Bengaluru

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8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

### Table 5-19: List of plantation details

# 2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 5-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 5-20: List of plants/trees in campus

#### 5.1.6. Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 5-21.

S. No	Description	Details
1	Whether college provides transport facility for staff and students (Yes/No)	
2	Number (or Percentage) of staff using transport services provided by college	
3	Number (or Percentage) of students using transport services provided by college	
4	Number (or Percentage) of Staff using public transport	
5	Number (or Percentage) of Staff using Bike	
6	Number (or Percentage) of Staff using Car	
7	Number (or Percentage) of students using Public transport	
8	Number (or Percentage) of students using Car	
9	Number (or Percentage) of students using Bike	
10	Number (or Percentage) of students using Bicycles	
11	Average consumption of diesel per month	
12	Average electricity consumption per month	
13	Average LPG consumption per month	

# Table 5-21: Details of Carbon footprint management

#### 5.1.7. Photos required for Audit:

# 1. General Photos

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 5-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

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6	Photos of any other policies adopted by college		
	7 Photos of water test report	Drinking Water	
		STP processed water	
7		Bore-well water	
		Other water Sources (Like Tanker water and any	
		other)	
8	Photos of use of Energy efficient devices like fan, bulbs etc.		
9	Photos of LCD/LED monitors used in Labs		
10	Photos of dry and wet waste collection binsPhotos of celebrating World Environment Day		
11			
12	Photos of celebrating World Water Day		
13	Photos of celebrating World Earth Day		
14	Photos of celebrating World Ozone Day		

Table 5-22: List of photos

# **QUALITY AUDIT REPORT**

# ON

# WATER AUDIT

OF

# THE OXFORD COLLEGE OF ENGINEERING 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068

2016 - 17 то 2020 - 21



**ENHANCING RESOURCE EFFICIENCY** 

# **QUALITY AUDIT REPORT**

# OF

# 'THE OXFORD COLLEGE OF ENGINEERING'

# 10TH MILESTONE, BOMMANAHALLI, HOSUR ROAD, BANGALORE - 560 068



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### For More Information

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# **ACKNOWLEDGEMENTS**

We are thankful to the management of **The Oxford College of Engineering**, **Bengaluru**, for the support, guidance and, giving us the opportunity to be involved in this very interesting and challenging assignment.

We would be happy to provide any further clarifications, if required, to facilitate the implementation of the recommendations.

We received full co-operation and support from the concerned personnel/ staff members of the college. We would like to thank:

Chairman – The Oxford Educational Institutions

The Oxford College of Engineering

And other Staff in personnel who have given full co-operation and support. They took a keen interest and gave valuable inputs during the course of study.



# EEELLP ACKNOWLEDGEMENT

EEELLP team thanks the management of **The Oxford College of Engineering, Bengaluru** for assigning this interesting work to us. We appreciate the co-operation extended to our team during the entire process.

Our special thanks are due to Principal & Team of colleagues for giving us necessary inputs to carry out this very vital exercise. We would like to thank all the head of the departments and staff members who were actively involved while collecting the data and conducting field measurements.

# DISCLAIMER

The Audit Team has prepared this report for The Oxford College of Engineering, Bengaluru based on the input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

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

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

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# **ABBREVIATION AND ACRONYMS**

1.	А	:	Amperes
2.	AC	:	Air Conditioner
3.	APFC	:	Automatic Power Factor Controller
4.	AMF	:	Automatic Mains Failure
5.	BBMP	:	Bruhat Bengaluru Mahanagara Palike
6.	BESCOM	:	Bangalore Electricity Supply Company
7.	BWSSB	:	Bangalore Water Supply and Sewerage Board
8.	CC Camera	:	Closed Circuit Camera
9.	DG	:	Diesel Generators
10.	EE Fan	:	Energy Efficient Fan
11.	E-Waste	:	Electronic Waste
12.	FTL	:	Fluorescent Tube Light
13.	GHG	:	Green House Gas
14.	Hz	:	Hertz
15.	HP	:	Horse Power
16.	ΗT	:	High Tension
17.	Ι	:	Current
18.	ICT	:	Information and Communications Technology
19.	IQAC	:	Internal Quality Assurance Cell
20.	ISO	:	International Organization for Standardization
21.	kgs	:	Kilograms
22.	kL	:	Kilo Liters
23.	kV	:	kilo volt
24.	kVA	:	kilo volt ampere
25.	kVAr	:	Reactive kilo volt ampere
26.	kW	:	Kilo Watt
27.	kWh	:	kilo Watt hour
28.	kWp	:	kilo Watt peak
29.	LCD	:	Liquid Crystal Display
30.	LED	:	Light Emitting Diode
31.	LT	:	Low Tension
32.	mA	:	Milli Amperes
33.	MoU	:	Memorandum of Understanding
34.	NA	:	Not Applicable
35.	NAAC	:	National Assessment and Accreditation Council
36.	NSS	:	National Service Scheme
37.	OHT	:	Over Head Tank
38.	Prim/Sec	:	Primary/Secondary
39.	PF	:	Power factor
40.	Ph.D.	:	Doctor of Philosophy

41.	PV	:	Photo Voltaic
42.	RCC	:	Reinforced Cement Concrete
43.	RO	:	Reverse Osmosis
44.	RR. No.	:	Revenue Register Number.
45.	Sq. Ft.	:	Square Feet
46.	Sq.m.	:	Square Meter
47.	SRTPV	:	Solar Roof Top Photo Voltaic
48.	TL	:	Tube Light
49.	TR	:	Ton of Refrigeration
50.	ΤV	:	Television
51.	V	:	Volts
52.	W	:	Watts
53.	Wi-Fi	:	Wireless Fidelity
54.	Wp	:	Watt peak
55.	#	:	Number

# **1. INTRODUCTION**

The Oxford College of Engineering was started in the year 2000, is one of the most prestigious institutions in Bengaluru that provides quality teaching and training in professional UG courses in 10 streams of Engineering in, Computer Science, AIML, Electronics and Communication, Electrical and Electronics, Mechanical, Civil, Bio-Technology, Mechatronics & Automobile. College also offers 10 Postgraduate programs in Technology (M. Tech), Computer Application (MCA) and Business Administration (MBA), and 11 Research centers recognized by VTU to offer Ph.D. programs. College is affiliated with the Visvesvaraya Technological University (VTU) and approved by the All-India Council for Technical Education (AICTE). The college also has been accredited by the NBA, and IAO quality-assessed organizations. The Institute name is also included in the NIRF & AICTE CII Survey of Industry Linked Technical Institute- 2020. Institution is categorized in Band promising in ARIIA ranking in the year 2021. The college is set in a sprawling 11.5 acres campus in the prestigious IT corridor, ideal for education in a serene environment with over 85,000 square meters of built-up area spread over 2 blocks, with enormous investment for academic purposes. The college has well equipped with state-ofthe-art infrastructure facilities to carry out various real-time projects, research, and consultancy activities in recent technologies. All the Departments have undertaken many research/consultancy projects funded both by multinationals and government agencies. The college has a good number of research publications in various reputed journals and patents. College has a good number of R&D projects sponsored by AICTE, VGST, VTU, IEEE, ICMR BRNS, NIF, NRB(DRDO) & BIRAC. It has a history of excellent placement track record in various multinational companies' offers with high salary packages.

#### VISION

To develop competent students with good value systems and face challenges of the continuously changing world.

#### MISSION

To be respected and most sought-after engineering educational institutions engaged in equipping individuals capable of building learning organizations in the new millennium.

# **QUALITY POLICY**

To equip the students with highest standard of education, knowledge and ethics. To prepare them to meet the challenges of life with full confidence. Aim at all round development of the personality to be useful citizens.

### Campus Area and Built-up area

The area of the campus (built up and total) area is given in table 1-1.

S. No.	Description	Units	Details
1	Engineering Campus total area	Acres	11.5
2	Built up area	Sq. mt.	85,000

### Table 1-1: College Area

### **Committee and Cells**

The Oxford College of Engineering (TOCE) has various functional committees and cells. They are listed below,

- VTU/AICTE Committee
- o Planning & Accreditation Committee
- Library Committee
- Research and Development Committee
- o Training & Placement Committee
- o Faculty Development Committee
- o Purchase & Budget Committee
- o College Magazine/Calendar /Newsletter Committee
- o Professional Societies / Chapters
- o Cultural Association
- o Alumni Association

- o Sports Committee
- o NSS
- o Students Grievances Redressal Committee
- o Discipline Committee
- o Women's Grievance Redressal Committee
- o Anti-sexual Harassment Committee
- o Entrepreneurship & Incubation cell
- o Anti-Ragging Committee
- o Website, Server & Internet Committee
- o Public Relation Committee
- o Hostel & Canteen Committee
- o Prevention of Caste Based Discrimination Cell
- o College Internal Complaints Committee
- o Internal Task Force Team COVID 19 Coordination Committee
- o Internal Quality Assurance Cell (IQAC)
- o Exam Cell
- o Disability Recourse Centre
- o IPR Cell
- o IA Answer Scripts Evaluation Review Committee
- o IA Question Paper Scrutiny Committee

#### Internal Quality Assurance Cell (IQAC)

The college management constitutes the Internal Quality Assurance Cell including Principal, teaching faculty, non-teaching faculty, UG students (Male & Female), PG students (Male & Female), alumni, parent and industry representatives every year.

The list of Internal Quality Assurance Cell members for the academic year 2016-2017 is shown in figure 1-1.



#### Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2016

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SLNo	Name of Member	Designation	Role
1.	Dr. Praveena Gowda	Principal	Chairperson
2.	Dr. Malleshalah T.S.	Professor, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs. Uma	Office Staff	Member – Non Teaching Faculty Representative
4.	Ms. Shilpa	ECE Student	Member – UG Female Student Representative
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student member Representative
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member –Parent Representative
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative
11.	Dr. Mallikarjun K	Professor & Head Maths	Member - Coordinator
12.	Prof.Devi Vighneshwari	Asst. Prof in EEE	Joint Coordinator
	Copy to: 1. Chairman and Vice 2. Committee Membe 3. All the HOD's 4. IQAC File	Chairman	Principal & Chairperson IQAC PRINCIPAL e Oxford College of Engineering Bermanehalli, Hosur Road Bengaturu-550 068

Figure 1-1: List of IQAC members 2016-2017

The list of Internal Quality Assurance Cell members for the academic year 2017-2018 is shown in figure 1-2.



Proceedings of the Principal and Chairperson IQAC Order

Date:28/09/2017

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will er orders are issued. Following is the constitution of IQAC.

	De on sanc of Mamber	Designation	nore
SI.No	Name of Member	Reference	Chairperson
1.	Dr. Praveena Gowda	Professor, Dept. of Civil Eng.	Member -Teaching Faculty
-	Dr. Malleshalah 1.3.	Office	Member - Non Teaching Faculty
	Mrs. Uma	Staff	Member - UG Female Student
4.	Ms. Shilpa	ECE Student	Representative
5.	Mr. Harshvardhan NR	Civil Student	Member – UG Male Student Representative
6.	Ms. Lavanya R	MBA Student	Member – PG Female Student Representative
7.	Mr. Raja Paul	MCA Student	Member – PG Male Student member Representative
8.	Mr. Srinivas AS	Senior Software Engineer, Netcracker	Member – Alumni Representative
9.	Mr. C. Prakash Mr. Arun KV	Parent (of Male) Parent (of Female)	Member – Parent Representative
10.	Mr. Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representative
	De Mallibarius K	Professor & Head Maths	Member - Coordinator
11.	Dr. Manikarjon K	Asst. Prof in EEE	Joint Coordinator
14-	Prot.Devi viginiesittati		ANC

Copy to: 1. Chairmanand Vice Chairman

4. IQAC File

2. Committee Members 3. All the HOD's



The Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-560 068

Figure 1-2: List of IQAC members 2017-2018

The list of Internal Quality Assurance Cell members for the academic year 2018-2019 is shown in figure 1-3.



#### Proceedings of the Principal and Chairperson IQAC

Order

#### Date: 27/07/2018

By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Following is the constitution of IQAC

SI.No	Name of Member	Designation	Role
1.	Dr.Praveena Gowda	Principal	Chairperson
2.	Dr. Malleshaiah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative
4.	Ms.Ashmitha Dale Pais	CSE Student	Member – UG Female Student Representative
5.	Mr.Vishal Nadig	EEE Student	Member – UG Male Student Representative
6.	Ms.Dechekka K U	MBA Student	Member – PG Female Student Representative
7.	Mr.Manoj P	MCA Student	Member – PG Male Student member Representative
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative
11	Dr. Mallikariun K	Professor& Head Maths	Member - Coordinator
12	Prof Devi Viehoeshwari	Asst. Prof in EEE	Joint Coordinator

#### Copy to:

1. Chairman and Vice Chairman

2. Committee Members

3. All the HOD's

4. IQAC File



Principal'& Chairperson IQAC PRINCIPAL Ine Oxford College of Engineering Bommanahalli, Hosur Road Bengaluru-550 068.

#### Figure 1-3: List of IQAC members 2018-2019

The list of Internal Quality Assurance Cell members for the academic year 2019-2020 is shown in figure 1-4.



Proceedings of the Principal and Chairperson IQAC Order

Date: 27/07/2019

By the direction of the Governing body, undersigned is pleased to reconstitute internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will ed. Following is the constitution of IQAC

	be on same until further o	Designation	Role
1.No	Name of Member	Principal .	Chairperson
1.	Dr.A.S.Aravind	Principal	Member -Teaching Faculty
2.	Dr. Malleshalah T.S	Head, Dept. of Civil Eng.	Representative
	Dr. Wateshearthy		Member - Non Teaching Faculty
3.	Mrs.Uma	Office Staff	Representative
	The store is a store i		Member – UG Female Student
4.	Ms Ashmitha Dale Pais	CSE Student	Representative
			Member - UG Male Student
5.	Mr VishalNadig	EEE Student	Representative
	Na. The start of t		Member - PG Female Student
6.	Ata Duchakka KU	MBA Student	Representative
	MS.Decretka H o		Member - PG Male Student
7.	Mar Manol P	MCA Student	member Representative
	Wir,manoj *	Cooler Collupte Engineer, Netcracker	Mambar - Alumni Representative
8.	Mr Srinkas AS	Technologies Bangalore	Memoer - Addition representation
	Ma Standar	Recent (of Male)	Member -Parent Representative
9.	Mr.C.Prakash	Parent (of Female)	
	Mr.B.R.MHemaMaheshwar	Parent (or remain)	
10		General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member - Industry Representativ
Mr.Shamin Dud	Mr.Shamin Dudu		
11	Dr. Shashidhar	Professor & Head MCA	Member - Coordinator
			Joint Coordinator
12	Prof Devi Vighneshwari	Asst. Prof in EEE	and al al summer

#### Copy to:

1. Chairmanand Vice Chairman

- 2. Committee Members 3. All the HOD's
- 4. IQAC File

PRINCIPAL Bernmanshalli, Hosur Road Bengaluru-560 068.

Figure 1-4: List of IQAC members 2019-2020

The list of Internal Quality Assurance Cell members for the academic year 2020-2021 is shown in figure 1-5.





Proceedings of the Principal and Chairperson IQAC Order

Date:17/08/2020 By the direction of the Governing body, undersigned is pleased to reconstitute Internal Quality Assurance Cell (IQAC) for The Oxford College of Engineering; the cell shall report the work and activities of the cell once in three months, minimum four times in an academic year to the Governing body. These orders will come in to force from the day of issue of orders and they will be on same until further orders are issued. Followides it the constitution of DOC

SI No.	Name of Member	Designation	Role
1.	Dr.A.S.Aravind	Principal	Chairperson
2.	Dr. Malleshalah.T.S	Head, Dept. of Civil Eng.	Member -Teaching Faculty Representative
3.	Mrs.Uma	Office Staff	Member – Non Teaching Faculty Representative
4,	Ms.Sahana H G	CSE Student	Member – UG Female Student Representative
5.	Mr.Dildar Bashir	EEE Student	Member – UG Male Student Representative
6.	Ms. Dhanyatha K	MBA Student	Member – PG Female Student Representative
7.	Mr.Anmol	MCA Student	Member – PG Male Student member Representative
8.	Mr.Srinivas AS	Senior Software Engineer, Netcracker Technologies, Bangalore	Member - Alumni Representative
9.	Mr.C.Prakash Mr.B.R.M Hema Maheshwar	Parent (of Male) Parent (of Female)	Member -Parent Representative
10.	Mr.Shamin Dudu	General Manager, Power Train & Emobility, Robert BOSCH Engineering & Business Solutions Ltd, Bangalore	Member – Industry Representative
11.	Dr. Mallikarjun K	Professor& Head Maths	Member - Coordinator
12.	Prof.Devi Vighneshwari	Asst. Prof In EEE	Joint Coordinator
Cop 1 2 1 4	y to: Chairman and Yoe Chairman Conneittee Members Al the HOO KQAC File	College or call of the On Bormanshall Hosur Road	PRINCIPAL ford College of Engineering mmanahalli, Hotur Road Bengaluru-550 065

Figure 1-5: List of IQAC members 2020-2021

## **Overview of Quality Audit:**

Quality Audit helps college / facility to:

- Understand the usage of electricity, water and other natural resources
- Identify opportunities to conserve various natural resources
- Identify various technological improvements
- Evaluate the techno-commercial of identified conservative measures
- Create awareness among the students and staff
- Disseminate the commitment of management towards saving nature
- Develop a culture among students, staff and management to be socially responsible

# 2. PRE – AUDIT PHASE

A Pre-audit meeting is a prerequisite for the audit, it helps to meet and discuss about the schedule and documents required during the audit. The pre-audit meeting was conducted at The Oxford College of Engineering. During the meeting, introduction of team members, scope and objectives of the audit were discussed.

#### Management Commitment

The Management of the college has shown great commitment towards Quality Audit during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the Quality Auditing.

College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

## Scope and Goals of Quality Auditing

A clean and healthy environment aids effective learning and provides conducive learning environment. There are various efforts around the world to address environmental education issues. Quality auditing is one among them for educational institutions.

Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects.

This data will also provide a basis for calculating the economic benefits of resource conservation projects, by establishing the current rates of resource use and their associated costs. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self-audits.

# 3. **ON-SITE AUDIT PHASE**

# 3.1. Scope / Target Areas of Quality Auditing

# 3.1.1. Water Audit

Water Audit addresses water consumption, water sources, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

# 3.1.2. Energy Audit

Energy Audit addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability.

# 3.1.3. Waste Management Audit

Waste Audit addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

# 3.1.4. Green Campus Management Audit

Green campus initiatives are becoming an integral part of modern day's university systems. Green campus Audit helps in maintaining the air and water clean. It regulates the climatic conditions and provides a healthy and comfortable environment for living.

# 3.1.5. Environment Footprint Audit

Environment Footprint Audit addresses the usage of fossil fuels (coal, diesel, petrol and gas). The mode of commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels.
# 3.2. Audit Methodology and Approach

The methodology and approach adopted for the study involve various steps that include:

- Review of Document and records
- Review of Policies
- Review of MoU
- Review of various measures implemented
- Site Walkthrough
- Data Collection
- Interviews

# 3.2.1. Review of Document and Records

The various documents and records such as:

- o Electricity bills
- Water bills
- Equipment registers
- List of appliances
- o Internal Quality Audit document
- o Purchase document
- o Cash payment receipts
- o Equipment service report
- Maintenance and service payment receipts

were reviewed and, relevant data and inputs required for analysis have been collected.

## 3.2.2. Review of Policies

College has various policies that include safety policy and Anti-ragging policy.

## A. Safety Policy:

All the students, teaching staff, non-teaching staff, maintenance and house-keeping staff have been given training to use fire extinguishers in emergency situations of fire and explosion. Fire hydrant system is available at the campus. Also, fire extinguishing cylinders have been installed in each floor and in laboratory areas. Fire order statements and use of fire extinguisher has been posted at each block. Fire alarm is also installed at the premises. Photos of fire order and fire alarm are shown in figure 3-1 and 3-2.





Quality Audit Report of The Oxford College of Engineering, Bengaluru



Figure 3-2: Fire alarm panel at engineering old block

## B. Anti-Ragging policy:

Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, hostel, sports, canteen, etc.) whether located within the campus or outside and in all means of transportation of students whether public or private. **'Say No to Ragging'** poster is placed in each block of the campus and a sample photo is as shown in the figure 3-3.



Figure 3-3: Anti-ragging poster

## 3.2.3. Review of various measures implemented

During the Quality Audit study, it was observed the college has taken various initiatives in conserving natural resources that include:

- Internal Quality Assurance Cell including Staff, Students, Alumni, parents and industrial members.
- Installation of Solar Roof Top Photo Voltaic (SRTPV) system for power generation.
- Wheeling to grid is done.
- Installation of LED fixtures to reduce electricity consumption
- Installation of LCD/LED monitors for all the desktops to conserve electricity
- Switching OFF lights and fans whenever not in use to save electricity
- Installation of RO plant to provide purified drinking water.
- Dual water piping system for washrooms and toilets, to use STP treated water for flushing
- Sewage treatment and using the treated final water for toilet flushing, gardening and cleaning purposes
- Rain water harvesting system is available in the campus.
- Regular testing of STP treated water quality parameters
- Dedicated watering system for greeneries.
- The use of sign boards in all the wash rooms were observed, to create awareness for water conservation
- Installation of waste segregation bins at all the rooms to separate the dry and wet waste
- Maintenance of logbooks and registers is done properly.
- Training is conducted on regular basis regarding usage of fire extinguisher, conservation of resources such as electricity, water, food and green campus.
- Maintenance team is available for electrical, plumbing, waste management and green campus management.

# 3.2.4. Site walk through

Site walk through was conducted with staff members, students and audit team members. Staff and students have shown very keen interest in the data collection process and methods to be followed in field data collection. The staff and students have given inputs and suggestions for resource conservation as well.

## **College Infrastructure**

The Oxford College of Engineering campus has various blocks and departments. Each floor has state of the art class rooms, staff rooms, laboratories, libraries and many more. Details of infrastructure are as follows:

- 0 Inhouse hostel for boys and girls
- o Bank facility
- o 24 hrs. atm in the campus
- o Solar plant
- o Rain water harvesting
- o RO water facility
- 0 Lifts & ramps
- o Cafeteria
- o Gymnasium
- o Cricket stadium / basketball court / badminton court
- Wi-Fi facility in the campus
- o CCTV security
- Telephone and fax facility
- o Photocopying facility
- The oxford enterprises (stationery)
- 0 Library

- 0 Digital library
- o Extended library hours
- o Hospital facility
- o Free dental treatment
- o First aid, medical and counseling facility
- 0 Scholarships
- o Group insurance
- 0 Placements
- o Placements training
- o English language coaching
- o Add-on courses
- o Cloud based ERP for students
- 0 Transport
- Parking facility
- o Cultural activities center
- o Incubation Centre for research activity
- o Staff room
- o Smart class rooms
- o Conference room
- o Student common room
- o Green campus

# 3.2.5. Inventory Collection

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, computers, projectors, printers, scanners etc., The consolidated list of inventories is given in table 3-1.

	Dept	Flore Tube	escent Light	LE	D	CFL	Fa	n	Cor	nputer	Exha	_	<b>D</b> · · ·	Xer	сс	τν	<b>n</b> .		
S. No.		40 <del>V</del>	 MOR (36₩)	18₩ Tub e	12 ₩		Ceiling Fan	∀all moun tFan	LED /LCD Monito	CRT Monitors	ust Fans	ocan ners	ers	ox Mac hine	Came ra	Scre en	Proje ctor	AC	Refridg erator
1	AUTO ENGG	64	0	12	0	0	26	6	5	0	0	1	2	0	0	0	1	0	
2	BT	86	0	0	0	0	42	0	10	9	2	2	2	2	8	0	1	2	4
3	Chemistry	0	0	17	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
4	CSE	52	0	141	0	0	59	13	3	218	0	0	0	4	0	12	0	5	1
5	Civil	52	0	16	0	0	56	4	30	0	0	1	3	0	0	0	0	0	
6	ECE	81	0	0	0	0	44	11	48	0	3	0	4	0	7	0	3	1	
7	EEE	48	2	0	6	0	54	2	41	0	0	0	2	0	7	0	1	0	0
8	ISE	34	0	77	0	0	29	5	128	0	0	0	2	0	0	0	1	0	
9	Library	0	45	0	0	0	53	0	30	0	0	1	1	0	0	0	0	0	
10	Maths	16	0	0	0	0	14	1	5	0	0	0	7	0	0	0	0	0	
11	MBA	39	0	0	0	96	42	0	16	0	0	0	2	0	0	0	3	3	
12	MCA	51	0	0	0	0	31	0	242	0	0	0	2	0	3	0	0	9	
13	MECH	89	0	0	0	0	59	0	84	0	2	0	2	0	5	2	3	0	
14	MTE	24	0	0	0	0	19	0	3	0	0	0	1	0	4	0	1	0	
15	PHYSICS	39	0	0	0	0	27	1	2	0	0	0	1	0	6	0	0	0	
Tot	al (College)	675	47	263	6	96	567	43	647	227	7	5	31	6	40	14	14	20	5
То	tal(Hostel)	413	0	71	0	0	431	0	1	0	0	0	1	0	0	0	0	0	0
Tot	tal (Overall)	1088	47	334	6	96	998	43	648	227	7	5	32	6	40	14	14	20	5

Table 3-1: Consolidated list of inventories

## 3.2.6. Interviews

To collect the various data, information and operating patterns, interviews were conducted with college staff (Principal, teaching staff, non-teaching staff) and students. The consolidated information from the interviews is given in the following sub-sections.

### 3.2.6.1. List of Holidays:

The lists of holidays were collected during the study and the same is given below. The list of holidays for the year 2017 is shown in figure 3-4.

No.: CI	Ø: 3	te No. 40, 30 <sup>th</sup> Mi (Recognize 0410501/502, Fax	ain, 1" Phase, J.P. Nagar, Bangalore -560 078. d by Government of Karnataka) c: 30410569 E-mail: info@theoxford.cdu
	ES/PAYROLL/	01/2016-17	Date: 06-01-201
		NO	TIFICATION
	Sub: Gener	al Holidays de	clared by the Government of Karnataka
	for th	e Calendar Ye	ar 2017.
Karnat Educa	The following i taka for the C tional Institution	s the list of h alendar Year ons also.	polidays declared by the Government of 2017 as applicable for all The Oxford
SL.No	Date	Day	Occasion
1.	14-01-2017	Saturday	Uttarayana Punya Kala Sankranti Festiva
2.	26-01-2017	Thursday	Republic Day
3.	24-02-2017	Friday	Maha Shivaratri
4.	29-03-2017	Wednesday	Chandramana Ugadi
5.	14-04-2017	Friday	Good Friday & Dr. B.R.Ambedkar Jayanthi
6.	29-04-2017	Saturday	Basava Jayanthi
7.	01-05-2017	Monday	May Day
8.	26-06-2017	Monday	Kutub-E-Ramzan
9.	15-08-2017	Tuesday	Independence day
10.	25-08-2017	Friday	Varasiddhi Vinayaka Vrata
11.	02-09-2017	Saturday	Bakrid
12	19-09-2017	Tuesday	Mahalava Amavasye
1.2.	29-09-2017	Friday	Maha Navami Ayudapooja
13.	1 40 40 40 40 40 H H H	Saturday	Vijayadasami
13.	30-09-2017	Monday	Gandhi Jayanthi
13. 14. 15.	30-09-2017 02-10-2017	alonday	The second
13. 14. 15. 16.	30-09-2017 02-10-2017 05-10-2017	Thursday	Maharshi Valmiki Jayanthi
13. 14. 15. 16. 17.	30-09-2017 02-10-2017 05-10-2017 18-10-2017	Thursday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi
13. 14. 15. 16. 17. 18.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017	Thursday Wednesday Friday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali
13. 14. 15. 16. 17. 18. 19.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017	Thursday Wednesday Friday Wednesday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava
12. 13. 14. 15. 16. 17. 18. 19. 20.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017	Thursday Wednesday Friday Wednesday Monday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi
12. 13. 14. 15. 16. 17. 18. 19. 20. 21.	30-09-2017 02-10-2017 05-10-2017 18-10-2017 20-10-2017 01-11-2017 06-11-2017 01-12-2017	Thursday Wednesday Friday Wednesday Monday Friday	Maharshi Valmiki Jayanthi Naraka Chaturdashi Balipadyami Deepavali Kannada Rajyothsava Kanakadasa Jayanthi Id-Meelad

Figure 3-4: List of Holidays-2017

Quality Audit Report of The Oxford College of Engineering, Bengaluru

### The list of holidays for the year 2018 is shown in figure 3-5.

G		[Regn.No. 284/74-75] THE OXFORD EDUCATIONAL INSTITUTIONS C.A. Site No. 40, 30 <sup>th</sup> Main, 1 <sup>st</sup> Phase, J.P. Nagar, Bangalore -560 078. (Recognized by Government of Karnataka) ©: 30410501/502, Fax: 30410569 E-mail: info@theoxford.edu								
	No.: C	ES/111/GH/2	ES/111/GH/2017-18 Date: 12-12-2017 NOTIFICATION							
~		Sub: General Holidays declared by the Government of Karnataka for the Calendar Year 2018.								
	Govern The O	The following nment of Karn xford Educatio	is the list ataka for the nal Institution	of General Holidays declared by the Calendar Year 2018 as applicable for all s also.						
	Sl.No	Date	Day	Occasion .						
	1.	15-01-2018	Monday	Uttarayana Punya Kala/Sankranti Festiva						
	2.	26-01-2018	Friday	Republic Day						
	3.	13-02-2018	Tuesday	Maha Shivaratri						
	4.	29-03-2018	Thursday	Mahaveera Jayanthi						
	5.	30-03-2018	Friday	Good Friday						
	6,	18-04-2018	Wednesday	Basaya Jayanthi						
	7.	01-05-2018	Tuesday	May Day						
	8.	16-06-2018	Saturday	Kutub-e-Ramzan						
	9.	15-08-2018	Wednesday	Independence day						
	10.	22-08-2018	Wednesday	Bakrid						
	11.	13-09-2018	Thursday	Varasiddhi Vinayaka Vrata						
	12.	21-09-2018	Friday	Last day of Moharam						
	13.	02-10-2018	Tuesday	Gandhi Jayanthi						
	14.	08-10-2018	Monday	Mahalaya Amayasye						
	15.	18-10-2018	Thursday	Maha Navami, Ayudhapooja						
	16.	19-10-2018	Friday	Vijavadashami						
	17.	24-10-2018	Wednesday	Maharshi Valmiki Jayanthi						
	18.	01-11-2018	Thursday	Kannada Raivosthava						
	19.	06-11-2018	Tuesday	Naraka Chaturdashi						
	20.	08-11-2018	Thursday	Balipadyami, Deepavali						
	21.	21-11-2018	Wednesday	Id-Mcelad						
	22.	26-11-2018	Monday	Kanakadasa Jayanthi						
	23.	25-12-2018	Tuesday	Christmas Day						
	on 18-	This list does to 03-2018 & 14- If any of the H	not include Ch 04-2018 fallin folidays for the	andramana Ugadi & Dr. Ambedkar Jayan g on Sundays respectively. e festivals of Muslim fraternity notified abo						

shall be automatically applicable. Casual Leave or Earned Leave shall not be sanctioned in combination with any holidays.

-	1 2	SE
SNVL.	NARASIMHA	RAJU
	PRESIDENT	

To All the Heads of The Oxford Educational Institutions.

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Figure 3-5: List of Holidays-2018

The list of holidays for the year 2019 is shown in figure 3-6.



This list does not include Dr. Ambedkar Jayanthi, Maharshi Valmiki Jayanthi, Naraka Chathurdashi & Id-e-Milad which fall on 14-04-2019, 13-10-2019, 27-10-2019 and 10-11-2019 falling on Sundays respectively.

If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays.

1	- Lubba
SNVL.	NARASIMHA RAJU PRESIDENT

To

Figure 3-6: List of Holidays-2019

The list of holidays for the year 2020 is shown in figure 3-7.

G		THE	OXFORD Site No. 40, 30 (Reco) 30410501/502	S EDUCATION SOCIETY (Regd.) (kepn.No. 254/74-75) EDUCATIONAL INSTITUTIONS <sup>a</sup> Main, 1" Phase, J.P. Nagar, Bangalore-560 078. paized by Government of Karmataka) Fax: 30410569 E-mail: info@sheenford.edu
12.0		111/68/201	9-20	Date: 01-01-2020
Person Pro-	10.1 CEO		N	DTIFICATION
	Su The S	b: General Ho for the Cal	lidays decla endar Year	ared by the Government of Karnataka 2020. eral Holidays declared by the Government of crail Holidays for all The Oxford Educational
Ka	mataka	for the Calend	ar Year 2020	as application for
ins	titutions	also.	Den	Occasion
	SLNo.	Date	Day	Littarayana Punya Kala/Makara Sankranti
and a second	V	15-01-2020	Wednesday	Maha Shivaratri
	V.	21-02-2020	Friday	Ueadi
	12	25-03-2020	Wednesday	Mahaveern Javanthi
	3	06-04-2020	Monday	Good Friday
	150	10-04-2020	Friday	Dr. BR Ambedkar Jayanthi
10.00	3.6.	14-04-2020	Tuesday	Man Day
	P.	01-05-2020	Friday	Party Day
-ditte.	0.8	25-05-2020	Monday	Retaid
· 200.	8	01-08-2020	Saturday	Jaking Jacob Day
	18.3	15-08-2020	Saturday	Canasha Chathurthi
a state of the second	- 11	22-08-2020	Saturday	Mahelava Amayasye
and in the second	18.	17-09-2020	Thursday	Mahathma Gandhi Jayanthi
1.1	13.	02-10-2020	Monday	Vilava Dhashami
1.1	X.	26-10-2020	Monday	Id.e.Milad
1935000	10.	30-10-2020	Friday	Valmiki Javanthi
AL COURSE	16.	31-10-2020	Saturday	Naraka Chathurdashi
in. i	M.	14-11-2020	Manday	Balipadyami, Deepawali
is in	10.	16-11-2020	Thursday	Kanakadasa Jayanthi
	19.	03-12-2020	Eviday	Christmas
	This Mahanavi 26-04-203 If a nodified sutomatic	a list does not mi/Ayudha Po 20, 30-08-2020 ny of the Holis by notification cally applicable	include Rep oja and Kan , 25-10-2020 days for the of the Cow	ublic Day, Basava Jayanthi, Last Day of Monifa nada Rajyotsava falling on Sundays on 25-01-202 and 01-11-2020 respectively. festivals of Muslim fraternity notified above sta ernment of Karnataka, such notification shall
	i longi	and Leave or E	armed Leave	shall not be sanctioned for prefixing or suffixing
	Can any In	terrening work	ing days in co	ombination with holidays,
	or any m	Are serving when	Construction of the other	st.
				SNVL. MARASIMHA RAJU PRESIDENT
deres 1	To .		19000 100	an in the second
and the	All the He	cads of The Oxi	ord Educatio	nal Institutions.

Figure 3-7: List of Holidays-2020

The list of holidays for the year 2021 is shown in figure 3-8.



If any of the Holidays for the festivals of Muslim fraternity notified above stand modified by notification of the Government of Karnataka, such notification shall be automatically applicable.

Casual Leave or Earned Leave shall not be sanctioned for prefixing or suffixing or for any intervening working days in combination with holidays

> SNVL NARASIMHA RAJU PRESIDENT

40

Figure 3-8: List of Holidays-2021

## 3.2.6.2. Tentative Schedule of College

The tentative schedule of the college is 09.00 AM to 4:15 PM.

The library timing is 09:00 AM to 10:00 PM.

The details of the class sessions are given in table 3-2.

S. No.	Session	Timings		
1	1 <sup>st</sup> Hour	09:00 TO 9:55AM		
2	2 <sup>nd</sup> Hour	09:55 TO 10:50 AM		
3	Short Break	10:50 TO 11:00 AM		
4	3 <sup>rd</sup> Hour	11:00 TO 11:55 AM		
5	4 <sup>th</sup> Hour	11:55 TO 12:50 PM		
6	Lunch	12:50 TO 01:30 PM		
7	5 <sup>th</sup> Hour	1:30 TO 2:25 PM		
9	6 <sup>th</sup> Hour	2:25 TO 3:20 PM		
10	7 <sup>th</sup> Hour	3:20 TO 4:15 PM		

### Table 3-2: Tentative College Schedule

### 3.2.6.3. Staff and Students of College:

The number of staff including teaching, non-teaching, and house-keeping is given in the table 3-3. The number of students includes both boys and girls.

S. No.	Year	Teaching Staff	Non- Teaching staff	Total Staff	Total Students
1	2017	303	122	425	3572
2	2018	285	95	380	3044
3	2019	269	92	361	3124
4	2020	240	68	308	2728
5	2021	222	57	279	2722

### Table 3-3: Number of staff and students

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# 4. WATER AUDIT

# 4.1. Facility description

The water audit study involved carrying out various observations and analysis, to realistically assess usage of water and potential for water conservation.

Tanker water is the only source of water, for facilitating the water supply requirement of the entire campus. Three tankers are available. The tankers run throughout the day to bring water. The capacity of each tanker is 12kL.

Other sources of water such as BWSSB and borewell water are not available.

Figure 4-1, shows the tanker filling water to the sump.



Figure 4-1: Tanker filling water to the Sump

Figure 4-2, shows the water inlet of sump.



Figure 4-2: Water inlet of sump

The tanker water is filled into the sump. The capacity of sump is 240 kL. The sump has two sections i.e., sump for firefighting system (120 kL) and sump for water distribution (120 kL) to the campus. First, the water is filled to the firefighting sump and from there the water distribution sump gets filled. The water in firefighting section is kept in reserve all the time.

Figure 4-3, shows the underground sump.



# Figure 4-3: Underground sump

From sump, the water is distributed to all the RCC (Reinforced Cement Concrete) overhead tanks using three number of pumps. The capacity of each pump is 10HP and they are installed in pump room.

The pumps used for water distribution is shown in figure 4-4.



Figure 4-4: Pumps for water distribution

The water distribution to engineering new block, engineering old block, and girl's hostel block is done manually using valve mechanism.

The valve mechanism is shown in figure 4-5.



Figure 4-5: Valve mechanism at pump room

The location, type, capacity, quantity and water source of sump and overhead tanks are given in table 4-1.

S. No.	Location	Tank Type	Capacity, kL	Quantity	Source of water
1	Sump for tanker water	RCC	240	1	From Tanker
2	New Building- Terrace - Overhead Tank	RCC	24	2	From Sump
3	Old Building - Terrace - Overhead Tank	RCC	24	2	From Sump
4	Girls Hostel - Terrace - Overhead Tank	RCC	36	1	From Sump/ Treated STP water

## Table 4-1: Details of sump and overhead tanks

Based on the source, usage, type and recycling, water is classified as following types in the college campus that include:

- o Raw Water
- o Drinking Water
- o Hot Water
- o Rain Water
- o Sewage Water
- Treated Water (from Sewage Treatment Plant)

Details of the various types of water usages are discussed in detail, in the following sections.

## 4.1.1. Raw Water System

The schematic of raw water distribution system is given in figure 4-6.



### Figure 4-6: Schematic of Raw Water Distribution System

The raw water is brought using tankers (12 kL x 3No.s.) and the water is filled in the sump. In underground sump, 120 kL of raw water is kept in reserve for firefighting system. Another 120kL of raw water is stored in the distribution sump.

From distribution sump, the raw water is distributed to the overhead tanks located in terrace of engineering new block, engineering old block and girl's hostel block. The pumping of raw water from sump to overhead tanks is done using 3 No.s. of 10HP pumps in pump room.

### Engineering - New block:

There are two RCC overhead tanks at terrace of engineering new block. The capacity of each tank is 24kL. In each tank, 12kL of raw water is kept in reserve for firefighting system. Whereas, remaining 12kL of raw is ditributed to utility. First, the firefighting tank gets filled and then from there, the water gets filled in distribution tank.

The raw water is distributed to staff toilets, student toilets, handwash, and labs.

The overhead tanks at terrace of engineering new block are shown in figure 4-7 and 4.-8.



Figure 4-7: Engineering new block - OHT 1

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Figure 4-8: Engineering new block - OHT 2

### Engineering - Old block:

One RCC overhead tank is available at terrace of engineering old block. The capacity of tank is 24kL. In tank, 12kL of raw water is kept in reserve for firefighting system. Whereas, remaining 12kL of raw is ditributed to utility. First, firefighting tank gets filled and then from there, the water gets filled in distribution tank.

The raw water is distributed to staff toilets, student toilets, handwash, and labs. Also, the input for RO plant is taken from this OHT. The overheads tank of engineering old block in shown in figure 4-9.



Figure 4-9: Engineering old block - OHT

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### Girl's hostel block:

One overhead tank is available at terrace of girl's hostel block. Total capacaity of the tank is 36 kL. The tank is divided into three sections. The capacity of each section in tank is 12 kL. One section of tank with 12 kL raw water is kept in reserve for firefighting system. Other section with 12 kL is used for distribution to utility points like handwash, toilets, bathing, dishwash and cloth washing. Whereas, another section is filled with 12 kL of STP treated water. This water is used for toilet flushing through dual piping system. The overhead tank at terrace of girl's hostel block is shown in figure 4-10.



Figure 4-10: Girl's hostel block - OHT

## 4.1.1. Drinking Water System

To provide drinking water, RO (Reverse Osmosis) plants are installed at terrace of the engineering old block and terrace of girl's hostel block. The schematic of drinking water system is shown in figure 4-11.



#### Figure 4-11: Schematic of Drinking water system

### RO Plant I - at engineering old block:

To provide drinking water for engineering new and old blocks, RO plant I is installed at terrace of engineering old block. The input raw water for RO plant I is taken from RCC overhead tank of engineering old block.

The permeate rate is 500 lph (litres per hour). The processed RO water is stored in the RO tank (2 kL). From RO tank, the drinking water is distributed to the consumption points of

college campus. In each floor RO tap is available for providing RO drinking water. The RO drinking water is supplied for both new and old buildings of the Engineering campus.

The RO reject water is sent to collection tank of STP.

The RO plant installed at terrace of engineering old block is shown in figure 4-12.



Figure 4-12: RO plant I - Engineering old block

The sample image of RO drinking water consumption point in the campus is shown in figure 4-13.



Figure 4-13: RO water consumption points at college

## RO Plant II - at girl's hostel block:

To provide drinking water for girl's hostel block, RO plant II is installed at terrace of girl's hostel block. The input raw water for RO plant II is taken from RCC overhead tank of girl's hostel block.

The permeate rate is 1000 lph (litres per hour). The processed RO water is stored in the RO tank (1.5 kL). From RO tank, the drinking water is distributed to the consumption points of girl's hostel. In each floor RO tap is available for providing RO drinking water. The RO drinking water is supplied for each floor and dining hall of girl's hostel block.

The RO reject water is sent to collection tank of STP.

The RO plant installed at terrace of engineering old block is shown in figure 4-14.



Figure 4-14: RO plant II - Girl's hostel block

The sample image of RO drinking water consumption point in the girl's hostel corridor is shown in figure 4-15.



Figure 4-15: RO water consumption points at girl's hostel corridor

The sample image of RO drinking water consumption point in the girl's hostel dining hall is shown in figure 4-16.



Figure 4-16: RO water consumption at girl's hostel dining hall

# 4.1.2. Hot Water System

Hot water is mainly used for bathing purposes in the girl's hostel. To provide hot water facility solar water heater system is used. Three number of solar water heaters are installed at terrace. The capacity of each solar water heater is 3 kL. The input for solar water heaters is taken from overhead tank of girl's hostel. The hot water produced is distributed to all floors through a dedicated pipeline.

The solar water heaters installed at the terrace of girl's hostel is shown in figure 4-17 and figure 4-18.



Figure 4-17: Solar water heaters 1 & 2 at girl's hostel terrace



Figure 4-18: Solar water heater 3 at girl's hostel terrace

The sample image of hot water tap provision at hostel bathrooms is shown in figure 4-19.



Figure 4-19: Tap for hot water provision

# 4.1.3. Rain Water Harvesting System

The rain water harvesting system is available in the campus. The schematic of rain water harvesting system is shown in figure 4-20.



Figure 4-20: Schematic of rain water harvesting

The rain water from terrace of the buildings are brought down through a dedicated pipeline to the rain water chambers. Then, from rain water chambers the rain water is sent to the rain water harvesting pits through underground pipeline. There are two rain water harvesting pits available.
The sample image of pipeline for rain water from terrace of the engineering new block is shown in figure 4-21.



Figure 4-21: Pipeline for rain water from terrace

The rain water chamber is shown in figure 4-22.



Figure 4-22: Rain water chamber

The rain water harvesting pits are shown in figure 4-23 and 4-24. The pits are located near the STP area.



Figure 4-23: Rain water harvesting pit 1



Figure 4-24: Rain water harvesting pit 2

## 4.1.4. Sewage Water System

The sources of waste water in the college campus are as follows,

- o Washrooms
- o Toilets
- 0 Kitchen
- o Hostel
- o Labs
- RO reject
- o Canteen

The schematic of Sewage Treatment Plant (STP) is shown in figure 4-25.



Figure 4-25: Schematic of STP

The capacity of the Sewage Treatment Plant (STP) is 300 kL per day. The STP is actually operated for 100 kL per day. Waste water from the college and hostel premises are collected and treated at sewage treatment plant.

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The plumbing system (waste water collection, waste water transfer to STP, STP treated water storage and STP treated water to land scaping) is very well designed, the pipes are laid underground, and access / chambers are provided to regulate and control the flow of water.

The treated water from the STP is used for toilet flushing at engineering new block and girl's hostel. Treated STP water is supplied through a dedicated line for watering the garden. The STP area and collection tank is shown in figure 4-26.



Figure 4-26: STP area

The STP area and collection tank is shown in figure 4-27.



Figure 4-27: STP -Collection tank

The aeration tank and clarifier are shown in figure 4-28.



Figure 4-28: Aeration tank

The clarifier section is shown in figure 4-29.



Figure 4-29: Clarifier section

The treated effluent tank is shown in figure 4-30.



Figure 4-30: Treated effluent tank

The filtering tank is shown in figure 4-31.



Figure 4-31: Filter and chemical dosing tank

The chemical dosing tank is shown in figure 4-32.



Figure 4-32: Chemical dosing tank

The final sump for storing treated water is shown in figure 4.33.



Figure 4-33: Final sump for treated STP water

## Sludge drying unit:

The sludge drying unit is established near STP collection tank. The sludge drying unit has six tanks in which the sludge is let to dry naturally. The water from the sludge is sent to collection tank. The dry sludge is then removed and decomposed. The decomposed sludge along with the dry plant waste is used as manure for trees and plant. The sludge drying bed is shown in figure 4-34.



Figure 4-34: Sludge drying bed

The sludge decomposer pit is shown in figure 4-35.



Figure 4-35: Sludge decomposer pit

# 4.2. Best Practices Implemented for Water Conservation

## 4.2.1. Dual piping system

Dual piping system is implemented in engineering new block and girl's hostel block.

## Engineering new block:

The treated STP water is used for toilet flushing in new engineering block. For this purpose, pneumatic pressure pump system is installed at the STP room. The STP water is connected through a dedicated pipeline for toilet flushing. Three pneumatic pumps are used to pump water for flushing line. Whenever flush button is pressed the pneumatic pumping system delivers water for flushing line.

The pneumatic pressure tank for dual piping system is shown in figure 4-36.



Figure 4-36: Pneumatic pressure tank for dual piping system

The pneumatic pressure pumps for dual piping system are shown in figure 4-37.



Figure 4-37: Pneumatic pressure pumps for dual piping system

The dual piping system flushing button is shown in figure 4-38.



Figure 4-38: Dual piping system - Flushing button

#### Girl's hostel block:

66

The toilets in girl's hostel have been provided with dual piping system. The dual piping system consists of raw water piping network and STP treated water piping network. The STP treated water is pumped to the overhead tank of girl's hostel. The capacity of pump is 10 HP. The overhead tank in girl's hostel is capable of storing 12 kL of STP treated water. The STP treated water is used for toilet flushing through a dedicated pipeline.

The pump used for pumping STP treated water to the girl's hostel overhead tank is shown in figure 4-39.



Figure 4-39: Pump for treated STP water

The flushing tank connected to dual piping system is shown in figure 4-40.



Figure 4-40: Dual piping system - Flushing tank

## 4.2.2. STP treated water for garden use

The treated STP water is used for watering the trees and garden. For this purpose, dedicated pipeline is provided. Taps are provided at various locations to facilitate the watering of garden.

The tap near STP area for providing STP treated water to garden is shown in figure 4-41.



Figure 4-41: STP treated water tap for garden use- near STP area

The tap near engineering new block for providing STP treated water to garden is shown in figure 4-42.



Figure 4-42: STP treated water tap for garden use- near engineering new block

The institution has installed STP with capacity of 300 kLPD and the quantity of STP water treated per day is 100 kL/Day. The quantity of water reused and cost savings per annum is given in table 4-2.

S. No.	Description	Unit	Values
1	STP capacity	kL/Day	300
2	Quantity of STP water treated per day	kL/Day	100
3	Assumed quantity of water reused @ 40% utilization factor	kL/Day	40
4	No. of working days per year	Days	250
5	Annual Quantity of water reused (saved)	kL/Annum	10000
6	Average water cost	Rs./Litre	0.086
7	Annual cost savings achieved	Rs. lakh/year	8.6

Table 4-2: Annual quantity of water reused and cost savings by installation of STP

## 4.2.3. Regular testing of STP treated water

Testing water quality on a regular basis is an important part of maintaining a safe and reliable source. This will help ensure that the water source is properly protected from potential contamination, and that appropriate treatment is selected and operating properly. The STP treated water is tested regularly before it is used.

The sample STP treated water test report for the year 2017 is shown in figure 4-43.





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The sample invoice of STP treated water test report for the year 2018 is shown in figure 4-44.

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Figure 4-44: STP treated water test - Invoice- 2018

The sample STP treated water test report for the year 2019 is shown in figure 4-45.

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Figure 4-45: STP treated water test report - 2019

The sample STP treated water test report for the year 2020 is shown in figure 4-46.

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Figure 4-46: STP treated water test report - 2020

The sample STP treated water test report for the year 2021 is shown in figure 4-47.

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Figure 4-47: STP treated water test report - 2021

#### STP log sheet:

The STP log sheet is maintained properly. For each shift of operation, relevant information/data is entered in the log sheet by the STP operator.

The sample image of STP log sheet for the year 2017 is shown in figure 4-48.



Figure 4-48: STP - Log sheet - 2017

The sample image of STP log sheet for the year 2018 is shown in figure 4-49.



Figure 4-49: STP - Log sheet - 2018

The sample image of STP log sheet for the year 2019 is shown in figure 4-50.



Figure 4-50: STP - Log sheet - 2019

The sample image of STP log sheet for the year 2020 is shown in figure 4-51.



Figure 4-51: STP - Log sheet - 2020

The sample image of STP log sheet for the year 2021 is shown in figure 4-52.

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Figure 4-52: STP - Log sheet - 2021

#### STP maintenance activity:

The STP is maintained properly. If any problem occurs, then immediate attention is given and the problem is rectified.

The sample image of STP maintenance activity bill for the year 2017 is shown in figure 4-53.



Figure 4-53: STP maintenance activity bill - 2017

The sample image of STP maintenance activity bill for the year 2019 is shown in figure 4-54.

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Figure 4-54: STP maintenance activity bill - 2019
The sample image of STP maintenance activity bill for the year 2020 is shown in figure 4-55.



Figure 4-55: STP maintenance activity bill - 2020

The sample image of STP maintenance activity bill for the year 2021 is shown in figure 4-56.



Figure 4-56: STP maintenance activity bill - 2021

### 4.2.4. Rain Water Harvesting

Rainwater harvesting is the simple process or technology used to conserve rainwater by collecting, conveying, purifying and storing of rainwater for later use.

The benefits of rainwater harvesting system are listed below.

- Helps in reducing the water bill.
- Decreases the demand for water.
- Reduces the need of bore well water
- Promotes both water and energy conservation
- Improves the quality and quantity of groundwater
- o It is an excellent source of water for landscape irrigation

The college has a rain water harvesting system. It is located near STP area.

### 4.2.5. Regular maintenance of drinking water system

The drinking water system is well maintained and monitored regularly. If any fault occurs in RO plants, then immediate attention is given and it is rectified.

The image of sample bill for purchase of 2000 litres stainless steel tank to store RO processed water at engineering new block is shown in figure 4-57.



Figure 4-57: Sample bill - 2000 litres SS RO tank

The image of sample bill for RO plant maintenance activity at girl's hostel and engineering old block is shown in figure 4-58.

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Figure 4-58: Sample bill - RO plant maintenance activity

The image of sample bill for RO plant maintenance activity after lockdown at girl's hostel and engineering old block is shown in figure 4-59.

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Figure 4-59: Sample bill - RO plant maintenance - After lockdown

### 4.2.6. Regular checking of water distribution system

The water distribution system is checked regularly. Every week the plumbing department personnel checks all plumbing fixtures for any leakage and damages.

If any leakage or damage is found, then immediate attention is given. The leakage arresting and damage rectification are done immediately.

### 4.2.7. Awareness signboards

In order to create awareness regarding water conservation, signboards indicating 'Do not waste water' 'Water is precious' are made available at appropriate locations.

Sign boards at dining hall and handwash area at girl's hostel are shown in figure 4-60 and figure 4-61.



Figure 4-60: Awareness signboards - At dining hall



Figure 4-61: Awareness signboards - At handwash area

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### 4.2.8. Awareness programs

### Lake Cleaning Activity - Special Camping Program - 2018:

During the NSS special camping program at Agara lake area. The lake cleaning activity was carried out. 50 Student volunteers with 2 faculty members were part of the program on **30<sup>th</sup> November, 2018**. The team went to Agara Lake by 10.00AM. The team involved in clearing cleaning the area which was overgrown with bushes and other sorts of wild plants. It took the whole day to clear the area of weeds and plastics which was strewn all over. The image of lake cleaning activity is shown in figure 4-62.



Figure 4-62: Lake Cleaning Activity - 2018

### SWACHHATA PAKHWADA- 2019:

NSS unit of The Oxford College of Engineering, Bangalore organized 1-day 'Swachhata Pakhwada' with the theme of 'Jal Shakti Abhiyan' in the campus on **September 11th, 2019**.

As part of the 'Jal Shakti Abhiyan', the college has formed a team of volunteers from department of Civil Engineering to study and monitor the status of the following water conservation activities:

- Water conservation
- o Renovation of traditional and other water bodies/tanks
- Ensuring all water cycling plant is functional.

Also, the team has organized awareness campaign on Water conservation, functioning of water cycling plant to first year engineering students in the campus. The sample image during the campaign is shown in figure 4-63.



Figure 4-63: Swachhata Pakhwada -2019

#### Awareness Campaign on Sewage Treatment Plant:

The workshop was on Sewage treatment plant by Mr. Somashekar R and Mr. Satish Kumar and has been conducted in the Department of civil engineering on 20th, August, 2019. Total of 5 Faculty members and 82 students from Civil Department took participation in this workshop. They have addressed students on different steps involved in wastewater treatment and recycling of wastewater. Mr. Somashekar R explained about advance treatment techniques in brief to the students.

At the end they have addressed the students regarding the importance of Recycling of water and reusing of treated wastewater in civil engineers' life.



The image taken during the campaign is shown in figure 4-64.

Figure 4-64: Awareness Campaign on Sewage Treatment Plant -2019

#### Save Water-Save Life Campaign

To create awareness among citizens of Bangalore regarding saving water, and utilizing waste water, Department of MBA in association with NSS unit of The Oxford college of Engineering has organized "**Save Water-Save Life Campaign**" on 17<sup>th</sup> July 2021 at Salarpuria Greenage Apartments, Bommanahalli.

The sample image of volunteers creating awareness during 'Save Water- Save Life' campaign is shown in figure 4-65.



Figure 4-65: Volunteers creating awareness about Save Water- Save Life -2021

### 4.2.9. Maintenance Team

The maintenance team performs regular monitoring of the water distribution system which involves general monitoring of the system, identifying and arresting of leakages, keep track of water requirement and ensuring availability of required water quantity, maintain and provide for the safe condition and operation of entire water distribution systems.

Proper operation and maintenance of sewage treatment plant ensures it will perform as designed to treat and safely dispose of sewage from the establishment and maximizes the efficiency of waste water treatment system.

During the audit, walk through survey was carried out to observe the maintenance of the water distribution system, log registers, preventive maintenance etc., The entire water distribution system is maintained clean and tidy. The water storing sumps, pumping sections, distribution lines, toilets, wash rooms and other water consumption points is found to be well maintained. The list of maintenance team members for plumbing department is given in table 4-3.

S. No.	Name	Designation
1	Mr. Kalingakumar Seth	STP Operator
2	Mr. Ashok babu T M	Plumber
3	Mr. Sahanuralamlaskar	Plumber

Table 4-3: Details of maintenance staffs-Plumbing department

# 4.3. Recommendations

## 4.3.1. Aerator for taps

The aerator is a small attachment that either fits onto the end of the tap or can be inserted inside of the existing spout. These water saving devices will control the amount of water that flows through the tap without affecting the water pressure as they mix the water with air which will save water and money.

The aerators will separate a single flow of water into many tiny streams which introduces the air in to the water flow. Also, as there is less space for the water to flow through, the water flow is reduced, resulting in water savings. As the water pressure is maintained, most people don't notice a difference in the amount of water coming out of an aerated faucet yet benefit from the water efficiency.

Tap aerators are of most use to those with older taps which run on average around 15 litres of water per minute. Adding an aerator to an older tap can reduce this to as little as 6 litres of water per minute.

The biggest water saving benefit is achieved in the bathroom / hand wash / kitchen sinks where you are often turning the taps on and off to wash your hands and for other uses.

The aerator tap is shown in figure 4-66.



Figure 4-66: Aerators for taps

Tap aerators can save as much as up to half your water usage through this way. When you are using aerated water, you are unlikely to notice the difference except for saving water resulting in lower bills.

### 4.3.2. Waterless Urinals

Traditional water-based urinals are one of the major waters consuming area in any facility. Apart from the normal water usage, the cost for handling raw water to the urinals is an added expenditure. Also, maintaining the water taps and flushes for urinals will add to maintenance cost as well.

To overcome these challenges and as part of water conservation measure, implementation of waterless urinals can be incorporated in the campus.

Waterless urinals may look similar to regular flush urinals, but they use no water and have no flush valves. The sample image of waterless urinals is shown in figure 4-67.



Figure 4-67: Waterless urinals

The advantages of water less urinals are as follows:

- Saves water
- o Reduces water bill
- Reduces maintenance cost
- Reduces water handling cost (electricity cost for pumping raw water)
- Reduces usage of chemicals
- o Improves overall bathroom hygiene

### 4.3.3. Water Flow Meters

For engineering campus, tankers are used as source of water. Water is pumped daily from the sump and distributed to overhead tanks available in each block for usage. The record for overall inwards quantity of tanker water is maintained.

However, data regarding the quantity of water used in each block per day is not accounted. With the presence of flow meters, it is possible to measure quantity of water used per day. Installing water flow meters at each block will quantify the water used in individual blocks.

Measurement is the first step towards conservation of water. Hence, water usage has to be measured by installing proper water flow meters at appropriate locations in each block.

# 5. ANNEXURES

# 5.1. Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

# 5.1.1. General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

### 1. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 5-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	Ι				
2	II				
3	III				

### Table 5-1: NAAC grading's Table

#### 2. Internal Quality Audit Team: 2020 – 2021

Table 5-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

### Table 5-2: Internal Quality Audit team

### 3. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 5-3.

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S. No.	Description	Details	
1.	Name of the		
	College and		
	address:		
1.a	Head office		
	address :		
2.	Telephone/Fax		
	No		
3.	Co-ordinating	Name:	·
	officer:	Mob:	
		Email:	
4.	Year of		
	Establishment:		
5.	Hostel		
	(Available/Not		
	Available)		
6.	No. of Working		
	days/year		
7.	Brief description		
	of Campus		

### Table 5-3: General information of the college

### 4. College Infrastructure

Infrastructure details of the college were gathered from table 5-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

#### Table 5-4: Detail Infrastructure of the college

- 5. Details of Student clubs
- 6. Details of cells that support students
- 7. Tentative Schedule of a working day:
- a. No. of working days per year:
- b. List of holidays:
- 8. Total area of the campus
- 9. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 5-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

#### Table 5-5: Details of the departments

#### 10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 5-6

	Teaching Staff	Non-teaching	Support Staff (Security,
S. No.		Staff	House Keeping)

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Male	Female	Male	Female	Male	Female

#### Table 5-6: Details of the Staff

### 11. Number of Students

Number of students is collected from table 5-7.

S. No.	Boys	Girls
1		

#### Table 5-7: Details of the Students

#### 12. Additional infrastructure details have been collected from table 5-8.

S. No.	Description	Details
1.	Number of blocks available for boys hostel	Nos.
2.	Number of rooms available for boys hostel	Nos.
3.	Number of blocks available for girls hostel	Nos.
4.	Number of rooms available for girls hostel	Nos.
5.	Whether Laundry is available in the hostel	Yes / No
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron )	
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No
9.	Whether lifts available in academic block	Yes / No
10.	Whether Kitchen is available in the academic block	Yes / No
11.	Whether any food counter (outside caterers) available in academic block	Yes / No

12.	Whether any commercial shops available in	Yes / No	
	academic block		
13.	Any more information or additional details of		
	academic block you would like to share -		
	kindly elaborate here		

### Table 5-8: Details of the departments

### 5.1.2. Water Audit details:

#### 1. General information

General information required for water management analysis is collected from table 5-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	

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S. No.	Description	Details
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well	
	water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

### Table 5-9: Water management details

#### 2. STP information

STP details are collected from table 5-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

#### Table 5-10: Details of STP

### 3. RO Plant information

RO Plant details are obtained from table 5-11.

S. No.	Location	Quantity	Capacity
1.			
2.			

3.	
----	--

Table 5-11: Details of RO Plant

### 5.1.3. Energy consumption details:

#### 1. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 5-12.

S. No.	Туре	Units		Value	Cost in Rs.
1	Electricity	kWh	2019		
			2020		
2	LPG	Cylinders			
3	Diesel	Litres (Mont	h wise		
		consumption	for		
		the last two y	ears)		
4	Others resources				
	(Please specify)				
5	Total connected load	kW			
6	Contract demand	kVA			
7	Maximum demand	kVA			
	recorded				
8	Average power factor				
9	Energy charges	Rs./kWh			
10	Demand charges	Rs./kVA			
	* Attach Electricity B	ill Copy of la	st 2 yea	rs	

#### Table 5-12: Details of Energy consumption

### 2. Solar Energy details:

The solar energy details required are collected from table 5-13.

S.	Buildin	Sol	ar water H	leater	Solar PV System		
No	g No./	Capacit	Workin	Year of	Capacit	Workin	Year of
•	Name	у	g / Not	Installatio	у	g / Not	Installatio
			working	n		working	n

2				

#### Table 5-13: Details of Solar Energy

- 3. Solar Street lights details:
- a. Quantity -
- b. Capacity -
- c. Year of Installation -

### 4. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 5-14.

S. No.	Description	Details
1.	Number of Transformers Installed	Nos.
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No
4	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No
8	Whether Air Conditioning Units have been installed in the campus	Yes / No
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.
10.	Total number of computers available in the campus	Nos.
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.
12.	Whether water coolers are installed in the academic blocks	Yes/No

S. No.	Description	Detai	ils
13.	Type of lamps (Fluorescent Tube Light, CFL, LED,	Nos.	
	Incandescent, Sodium / Mercury lamps, etc.,)		
	installed in the campus		
14.	Type of fans (ceiling, wall mount, standing, exhaust,	Nos.	
	etc.,) installed in the campus		
15.	Whether exhaust fans are installed in hostel /	Yes /No	
	kitchen.(If Yes, share the quantity and installed		
	location)		
16.	Any other electrical equipment's in college buildings.		

# Table 5-14: Details of Electrical Equipment

- 5. List of energy saving initiatives implemented
- 6. List of energy saving initiatives in plan for future

### 5.1.4. Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

### 1. Basic information

Basic information for waste management is collected from table 5-15.

S. No.	Description	Yes/ No
1	Whether wet and dry garbage segregation is done inside the	
	campus?	
2	Whether garbage is given to external agencies / municipal agencies?	

#### Table 5-15: Basic details of waste management

### 2. Types of Waste generated

Types of waste generated in the college are obtained from table 5-16.

S. No.	Description	Yes /	Remarks
		No	
1	E-Waste (Computers, electrical and electronic parts)		
2	Hazardous / Chemical Waste		
3	Solid Waste (Damaged furniture, paper waste, paper plates)		
4	Dry Leaves		
5	Food Waste		
6	Waste Water (Washing, urinals, bathrooms)		
7	Glass Waste (Broken glass wares from the labs)		
8	Unused Materials		
9	Plastic Waste (Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc.)		

#### Table 5-16: Types of waste generated

#### 3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 5-17.

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S. No.	Location	Bio- degradable	Non- Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

#### Table 5-17: Segregation of waste

#### 4. Waste generation management

Waste generation management of the college was collected from table 5-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

#### Table 5-18: Waste Disposal methods

### 5.1.5. Green campus management details:

#### 1. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 5-19

S. No	Description Details	
1	Total number of plant species identified	
2	Total number of plants on the campus	
3	Total number of Trees on the campus	
4	Garden area inside the college –	
5	Total number of medicinal plants /trees on the campus	
6	Total number of vegetables and fruits plantation in the	
	campus	
7	Whether display boards are given to plants and trees for	
	identification	

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8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

#### Table 5-19: List of plantation details

### 2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 5-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 5-20: List of plants/trees in campus

# 5.1.6. Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 5-21.

S. No	Description	Details
1	Whether college provides transport facility for staff and students (Yes/No)	
2	Number (or Percentage) of staff using transport services provided by college	
3	Number (or Percentage) of students using transport services provided by college	
4	Number (or Percentage) of Staff using public transport	
5	Number (or Percentage) of Staff using Bike	
6	Number (or Percentage) of Staff using Car	
7	Number (or Percentage) of students using Public transport	
8	Number (or Percentage) of students using Car	
9	Number (or Percentage) of students using Bike	
10	Number (or Percentage) of students using Bicycles	
11	Average consumption of diesel per month	
12	Average electricity consumption per month	
13	Average LPG consumption per month	

### Table 5-21: Details of Carbon footprint management

## 5.1.7. Photos required for Audit:

### 1. General Photos

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 5-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

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6	Photos of any other policies adopted by college		
	Dhoton	Drinking Water	
	of water	STP processed water	
7		Bore-well water	
	report	Other water Sources (Like Tanker water and any	
	report	other)	
8	Photos of use of Energy efficient devices like fan, bulbs etc.		
9	Photos of LCD/LED monitors used in Labs		
10	Photos of dry and wet waste collection bins		
11	Photos of celebrating World Environment Day		
12	Photos of celebrating World Water Day		
13	Photos of celebrating World Earth Day		
14	Photos of celebrating World Ozone Day		

Table 5-22: List of photos