

GREEN AUDIT REPORT

2019-2020



INTERNAL QUALITY ASSURANCE CELL
(IQAC)

Guru Nanak Dev Engineering College,
Ludhiana

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INTRODUCTION:

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of institute. It aims to analyse environmental practices within and outside of the concerned place, which will have an impact on the eco-friendly atmosphere. Green audit is a valuable means for a college to determine how and where they are using the most energy or water or other resources; the college can then consider how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric CO₂ from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures.

OBJECTIVES:

In recent time, the Green Audit of an institution has been becoming a paramount important for self-assessment of the institution which reflects the role of the institution in mitigating the present environmental problems. The college has been putting efforts to keep our environment clean since its inception. Therefore, the purpose of the present green audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Audit are:

- To map the Geographical Location of the college
- To document the floral and faunal diversity of the college
- To record the meteorological parameter of Ludhiana where college is situated
- To document the ambient environmental condition of weather, air, water and noise of the college
- To document the waste disposal system
- To estimate the Energy requirements of the college
- To report the expenditure on green initiatives during the last five years

METHODOLOGY:

The purpose of the green audit of GNDEC is to ensure that the practices followed in the campus are in accordance with the Green Policy of the country. The methodology includes: collection of data, physical inspection of the campus, observation and review of the documentation and data analysis.

ABOUT THE COLLEGE:

Guru Nanak Dev Engineering College, one of the prestigious, oldest and minority institution of Northern India, was established under the aegis of Nankana Sahib Education Trust (NSET) in 1956. NSET was founded in memory of the most sacred temple of Nankana Sahib, birth place of Guru Nanak Dev Ji. Shiromani Gurudwara Prabandhak Committee, Amritsar, a premier organization of universal brotherhood, which is the main force behind the mission of "Removal of Economic Backwardness through Technology" and NSET with the same mission, established a Polytechnic in 1953 and Guru Nanak Dev Engineering College (GNDEC) in 1956. The Trust deed was registered on 24th February 1953 with a commitment by Nankana Sahib Education Trust to uplift the vast weaker section of Indian polity comprising Rural India by admitting 70% students every year from Rural Areas. This commitment was made to the nation on 8th April, 1956. The day when foundation stone of the College was laid by Late Dr. Rajendra Prasad Ji, the First President of India.

The College was affiliated with Punjab University, Chandigarh since its inception. On establishment of Punjab Technical University, Jalandhar, since 1997 the college is affiliated with it, which is now known as I.K. Gujral Punjab Technical University (IKGPTU). The College courses are approved by All India Council for Technical Education, New Delhi. This is the first Engineering College of Punjab, which was conferred Autonomous Status by University Grants Commission (UGC), New Delhi in 2012 under section 2(f) and 12(B) of UGC Act 1956. Most of the undergraduate courses are accredited by National Board of Accreditation about 3 times since 2004. The college is accredited with 'A' Grade by NAAC, UGC. Tata Consultancy Services (TCS) has accredited this college twice for placement purpose. The college is also ISO 9001-2015 Certified.

MHRD, Govt. of India has sanctioned Rs. 10 Crores for Technical Education Quality Improvement Programme-II (TEQIP-II) to this College and the Department of Science and Technology (DST) also sanctioned Rs. 1 Crores under FIST Programme for carrying out the research activities. The College has received grant to the tune of Rs. 5 Crores for research & other activities by different agencies like AICTE, UGC and DST etc. MHRD has recently granted Technical Education Quality Improvement Programme-III (TEQIP-III) also.

GNDEC is overall sports champion of Punjab Technical University (Now, IKGPTU) & also in its survey declared GNDEC Best Engineering college a number of times for excellent placements amongst all its affiliated colleges. There is one N.C.C. Company in the institution attached with 3 Pb., Bn N.C.C. (Boy Cadets = 79, Girl Cadet = 27, total of 106 Cadets. Three and a half units of N.S.S. having a total of 350 volunteers have been allotted by IKGPTU to provide opportunities to the students for Social Services in various fields like blood donation, plantation, cleanliness etc. However a total of more than 1000 volunteers are enrolled in NSS in the College each academic year. FM Radio Station has been established after sanction by Govt. of India for educating the general public.

The College has been ranked consistently within first 50 engineering colleges of the country which includes IITs and NITs by different independent national agencies like India Today, Outlook, CSR, Star TV etc. since 2006.

GNDEC runs seven Engineering Branches (Civil Engg., Mech. Engg, Elect.Engg., Electronics & Comm. Engg. Computer Sc. & Engg., Information Technology, Production Engg.) at UG level and 15 PG level courses including MBA, MCA. The college has Ph.D in all Engineering Branches and it is a QIP Centre under AICTE for Ph.D in streams viz. Civil Engg., Mech. Engg. Electrical Engineering. Nearly 25,000 Graduates and 7500 Post Graduates have passed out from this college and are at present successfully employed on high profile jobs in India & abroad making their alma mater proud of them.

The College achieved an impressive ranking of 602 in U metric Green metrics ranking released for the year 2018 and 679 for the year 2019. It was the only college in north of country to be included in this ranking. The picture shows the ranking and the geo-tag for the ranking.

1/25/2020 Detail Ranking 2018 | UI GreenMetric
greenmetric.ui.ac.id/detailranking2018/?univ=gndec.ac.in 1/3

Detail Ranking 2018

HOME (HTTP://GREENMETRIC.UI.AC.ID/) \

Ranking	University	Country	Total	Setting & Score	Energy	Waste	Water	Transportation	Education & Research
602	Guru Nanak Dev								
	Engineering College (http://0)								
			3275	1000	950	450	175	625	75

Detail Ranking 2019

HOME (HTTP://GREENMETRIC.UI.AC.ID/) \

Ranking	University	Country	Total	Setting & Score	Energy	Waste	Water	Transportation	Education & Research
679	Guru Nanak Dev								
	Engineering College (http://0)								
			3025	925	775	450	175	550	150

VISION & MISSION VISION STATEMENT:

OUR VISION

Realization of Glimpses of a Golden India in the real(rural) India which lives and abounds in its villages. GNDEC will excel nationally and distinguish itself as a recognized pre-eminent leader to serve this 70% Brotherhood through its socioeconomic upliftment by exposure of the have-nots to Engg. & Technology thereby grooming them as technically competent and intellectually-vital Graduates through practically focused quality learning experiences, and thus assuring productive Careers for them.

OUR MISSION

- Upliftment of Rural Students through technical education.
- Respond to local societal needs by developing selected 'targeted research projects'.
- Quality training programs in need based modern technology.
- To maintain state-of-the-art infrastructure in laboratories.
- To promote culture of self-employment.
- To impart non-formal education to unemployed youth.
- To inculcate moral, ethical, spiritual values in education at all levels.

GREEN AUDITING:

The college has adopted the 'Green Campus' system for environmental conservation and sustainability. There are main three pillars i.e. zero environmental foot print, positive impact on occupant health and performance and 100% graduates demonstrating environmental literacy. The goal is to reduce CO₂ emission, energy and water use, while creating atmosphere where students can learn and be healthy.

LAND USE ANALYSIS, GNDEC, Ludhiana PUNJAB (As on 29-12-2019):

GENERAL OVERVIEW OF THE CONCEPT OF LANDUSE

Land use refers to man's activities and the various uses which are carried on and derived from land. Viewing the earth from space, it is now very crucial in man's activities on natural resource. In situations of rapid changes in land use, observations of the Earth from space give the information of human activities and utilization of the landscape.

Remote sensing and GIS techniques are now providing new tools for advanced land use mapping and planning. The collection of remotely sensed data facilitates the synoptic analyses of earth system, functions, patterning, and change in the local, regional as well as at global scales over time. Satellite imagery particularly is a valuable tool for generating land use map.

METHODOLOGY ADOPTED FOR LAND USE MAPPING

Three types of data that are GPS points, field survey data and Google earth data for Geo referencing have been used in this study. Land use map of the study area have been prepared using the above three types of data with the help of ArcGis Prosoftware.

DATA PROCESSING AND ANALYSIS

Land use map preparation is executed through the following steps:

Acquisition of data (Location: 30°51'24.59" N 75°51'25.79" E), Geo-coding and Geo referencing of satellite imageries by extracting the ground control points. Supervised classification was carried out with the aid of ground truth data collected during field survey. Scanning and digitization of maps and editing of all the Georeferenced maps were done using GIS. Data manipulation and analysis and linking the spatial data with the attribute data for creation of topology was carried out using GIS software. Creation of GIS output in the form of land use map showing various land use have been prepared.

Therefore, attempt has been made in this study to map land use for GNDEC, Ludhiana, Punjab with a view to detect the land consumption in the built-up land area using both remote sensing and GIS techniques.

GEOGRAPHICAL LOCATION WITH CAMPUS MAP IN SCALE

The college has a **sprawling pollution-free campus spread over 88 acres** of land in the heart of Ludhiana. Ludhiana is called as Manchester of India and known for cycles/ cycle parts, Hosiery & Sewing machines. Ludhiana has a long and illustrious history. Located in central region known as Malwa in agricultural state of Punjab, Ludhiana has been in forefront of industrial development with many focal points and industrial areas,

The Airport is at Sahnewal. Scaled image of college campus is shown in Photo 1. Green color in Map is representing green area. The Google aerial views of College Campus Part1 and Part 2 have been shown in Photo 2 and 3 respectively which are showing different college buildings, sports stadium, hostels and residential areas.

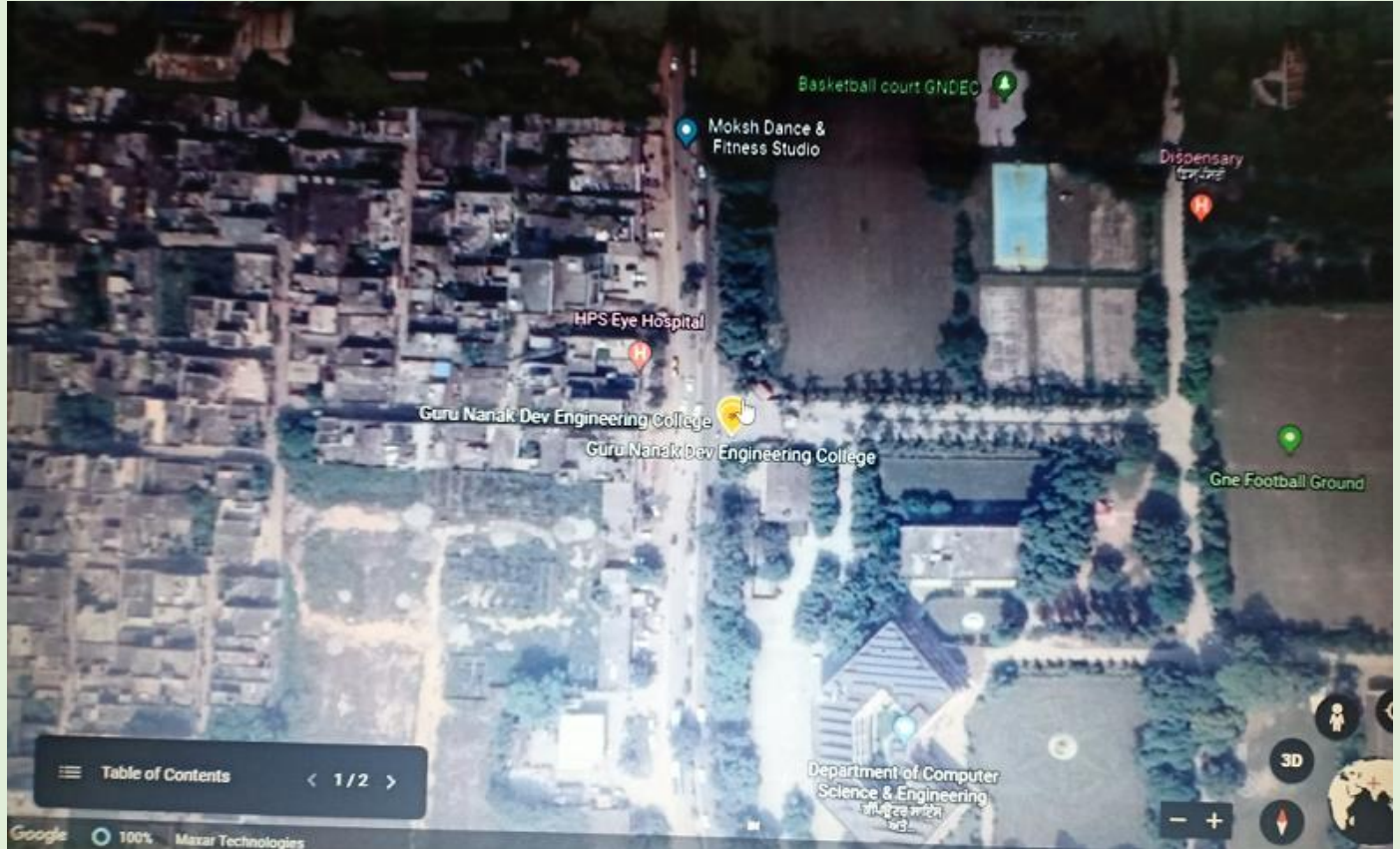


Photo 1: Aerial View of College Campus Part 1
(Source: GoogleEarth)

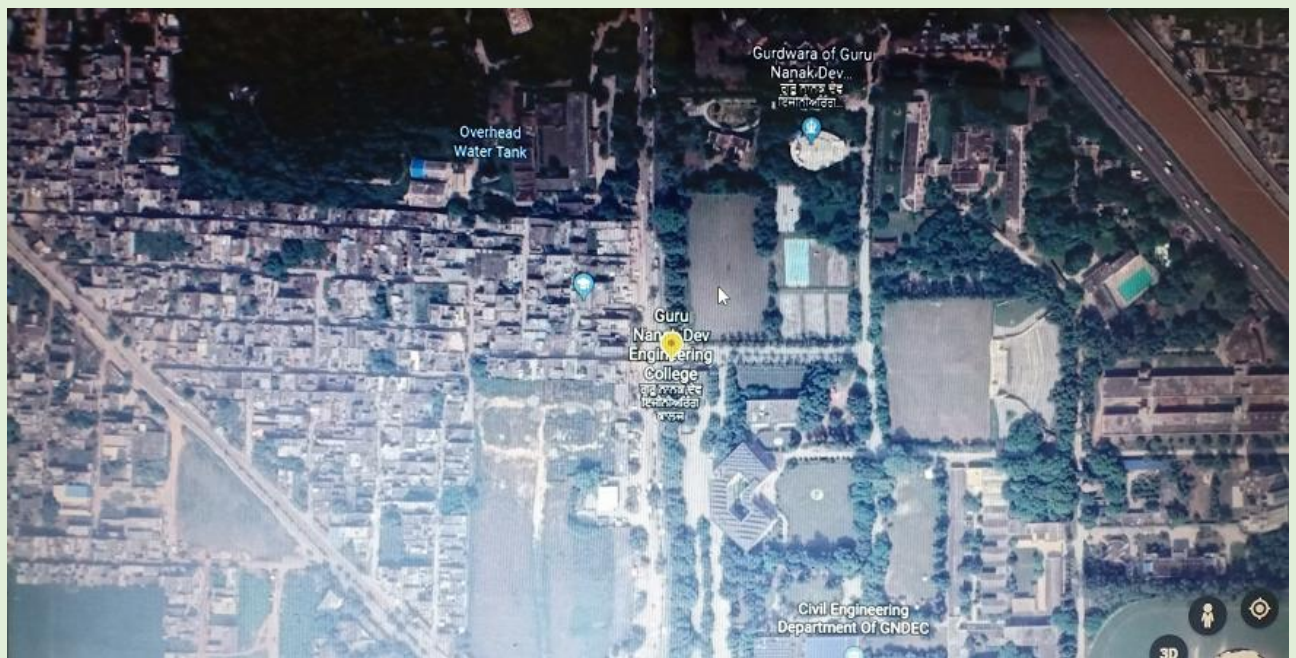
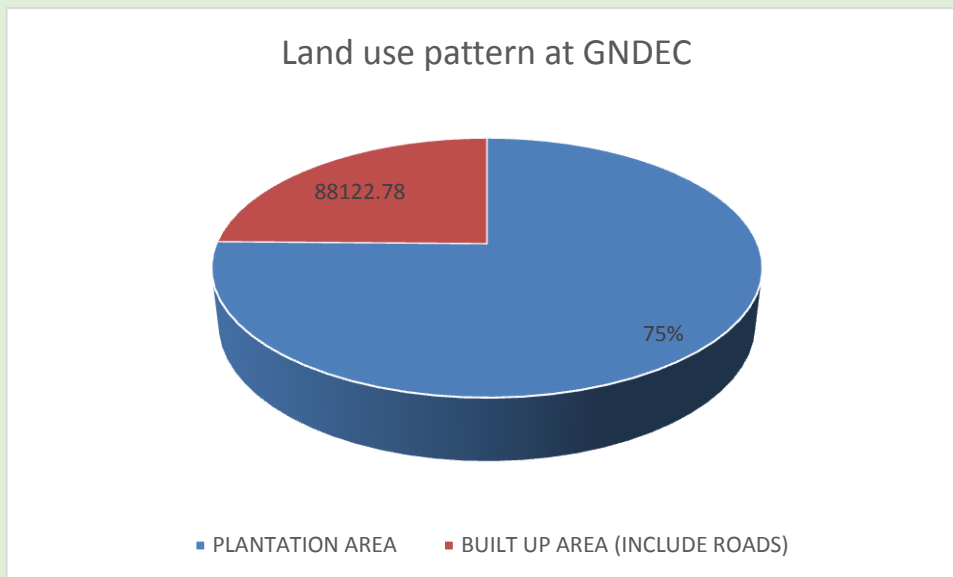


Photo 2: Aerial View of College Campus Part 2 (Source: GoogleEarth)

LAND USE DATA OF GNDEC, Ludhiana, PUNJAB

<i>CATEGORIES OF LAND USE</i>	<i>AREA (m²)</i>
PLANTATION AREA	268008.34
BUILT UP AREA (INCLUDE ROADS)	88122.78
TOTAL AREA	356131.12



The total area of GNDEC, Ludhiana is 356131.12 m² out of which the built up area (include Roads) is 25% (i.e. 88122.78 m²) and plantation area is 75% (i.e. 268008.34 m²).

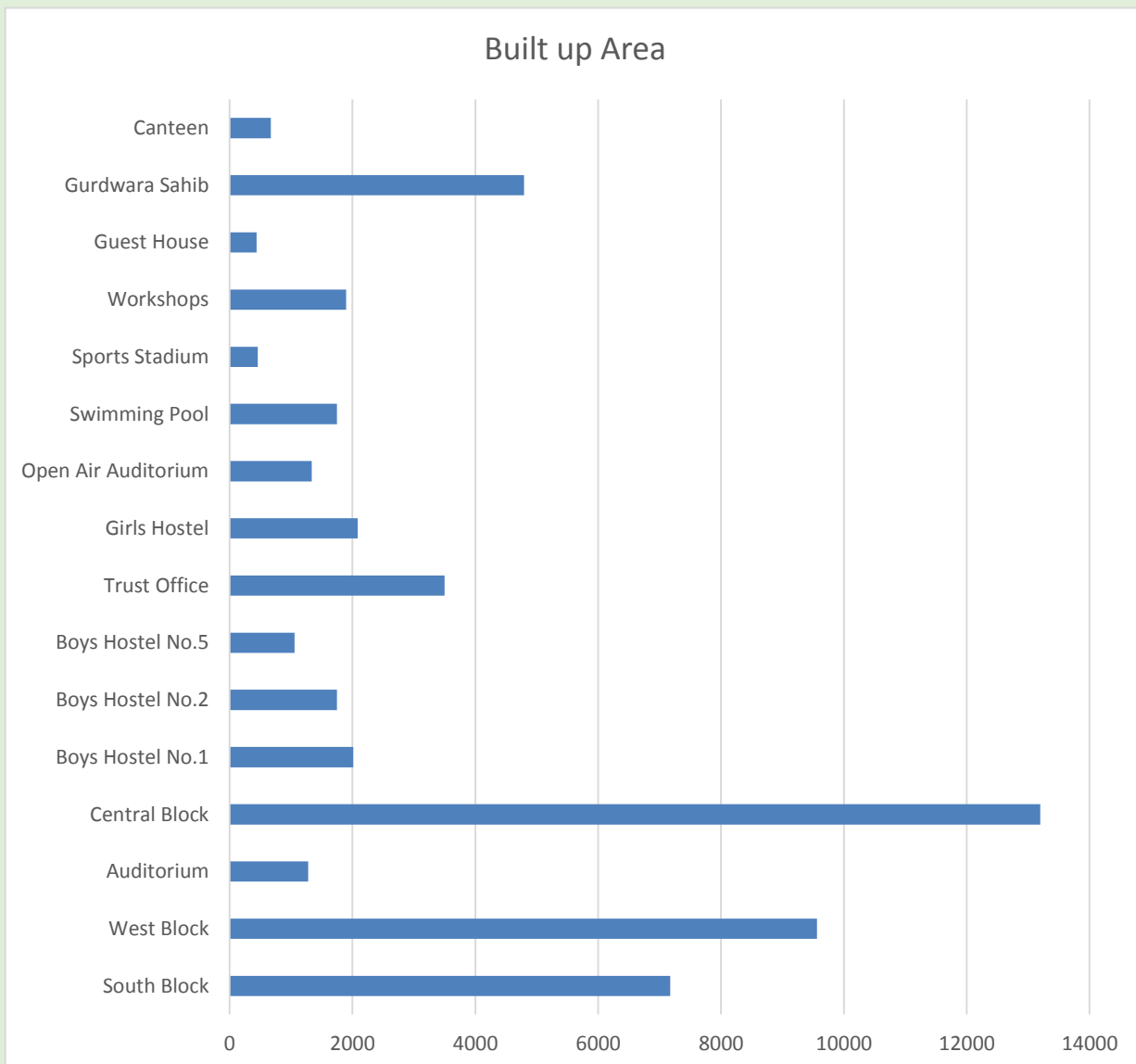
LAND USE (BUILT UP AREA) ANALYSIS:

The built up area of 25% (i.e. 88122.78 m²) consists of the following regions as stated below for land consumption in built up area of GNDEC:

The southern region of GNDEC is densely built up having **Main Administrative Block:** Administrative Blocks, Civil Engineering Block, Electrical Engineering, Electronics & Communications Engineering, Mechanical Engineering, Production Engineering, Central Workshops and auditorium. The northern region comprises of: Faculty Flats, Sports Stadium and Athletic Tracks. The western region has MBA & PG block, Girls Hostel, Faculty Flats & Gurdwara sahib. The central region has Boys hostels, Trust office, canteens, and dispensary.

Table: Area occupied by various buildings at GNDEC, Ludhiana

Sr No	Name of Building	Number of Floors	Area (m²)
1.	South Block (Main building)	03	7172
2.	West Block (PG block+MBA)	03	9563
3.	Auditorium	01	1278
4.	Central Block	01	13197
5.	Boys Hostel No.1	02	2014
6.	Boys Hostel No.2	02	1747
7.	Boys Hostel No.5	07	1056
8.	Trust Office	02	3498
9.	Girls Hostel	03	2085
10.	Open Air Auditorium	01	1337
11.	Swimming Pool	01	1747
12.	Sports Stadium	01	460
13.	Workshops	01	1895
14.	Guest House	01	441
15.	Gurdwara Sahib	01	4793
16.	Canteen	01	671



FINDINGS:

GNDEC, which was established in the year 1956, has an eco-friendly environment. It has a long legacy of healthy environmental practices including periodic plantation, their preservation and maintenance. Its land use is such that about 75% of the total area is occupied by open land and plantation that generates a better and sustainable campus environment.

The Land use analysis Report is prepared by Er. Yogesh Sharma, Civil Engineering Department, under the supervision of Dr. Harvinder Singh, Faculty of the department of Civil Engineering, GNDEC, Ludhiana

TREE DIVERSITY OF GNDEC, Ludhiana, PUNJAB:

GNDEC is within the geo-position between latitude 30°51'24.59" N and longitude 75°51'25.79" E in Ludhiana, Punjab, India. It encompasses an area of about 88 Acres. The area is immensely diverse with a variety of tree species performing a variety of functions. Most of these tree species are planted in different periods of time through various plantation programmes organised by the authority and have become an integral part of the college. The trees of the college have increased the quality of life, not only the college fraternity but also the people around of the college in terms of contributing to our environment by providing oxygen, improving air quality, climate amelioration, conservation of water, preserving soil, and supporting wildlife, controlling climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer. Many species of birds are dependent on these trees mainly for food and shelter. Nectar of flowers and plants is a favourite of birds and many insects. Leaf – covered branches keep many animals, such as birds and squirrels, out of reach of predators. Different species display a seemingly endless variety of shapes, forms, texture and vibrant colours. Even individual trees vary their appearance throughout the course of the year as the seasons change. The strength, long lifespan and regal stature of trees give them a monument – like quality. They also remind us the glorious history of our institution in particular. We often make an emotional connection with these trees and sometime become personally attached to the ones that we see every day. A thick belt of large shady trees in the periphery of the college have found to be bringing down noise and cut down dust and storms. Thus, the college has been playing a significant role in maintaining the environment of the entire Ludhiana town in its surrounding areas. The following are the tree species with whom we are being attached-

Table: List of tree species of GNDEC, Ludhiana, PUNJAB

S.No.	Botanical Name	Family	Common Name	Total
1	Mangifera indica	Anacardiaceae	Mango	43
2	Alstonia Scholaris	Apocynaceae	Alstonia	5
3	Tabernaemontana divaricata	Apocynaceae	Crape jasmine	38
4	Araucaria heterophylla	Araucariaceae	Christmas Tree	20
5	Tabernaemontana	Apocynaceae	Chandni	34
6	Avartani	Sterculiaceae	Marorphalli	16
7	Phyllanthus emblica	Phyllanthaceae	Amla	9
8	Kigelia africana	Bignoniaceae	Balam Kheera	2
9	Terminalia bellirica	Combretaceae	Bahera	32
10	Delonix Regia	Royal poinciana	Gulmohar	67
11	Saraca asoca	Fabaceae	Ashoka	566
12	Callindria	Legumes	Phali	6

13	Alstonia	Apocynaceae	Sat patti	43
14	Varun	Capparidaceae	Shree	13
15	Oleander	Dogbanes	Kaner	3
16	Tamarindusindica	Fabaceae	Tamarind	1
17	Peach	Rosaceae	Aaroo	5
18	Punicagranatum	Lythraceae	Pomegranate	2
19	Pithecellobiumdulce	Legumes	Jungle jalebi	12
20	Magnolia champaca	Magnolia	Champa	21
21	Callistemon	Myrtle	Bottle brush	14
22	Toonaciliate	Meliaceae	Tun	63
23	Livistonachinensis	Palm	China Palm	4
24	Callistemon	Myrtaceae	Golden Bottle brush	17
25	Nyctanthes arbor-tristis	Olives	Harsingar	1
26	S. oleosa	Sapindaceae	Koylas	99
27	Arecales	Arecaceae	Manchi Palm	8
28	Ficus	Mullbery	Ficus	13
29	Psidium	Myrtaceae	Gauva	19
30	Cluster Fig	Mullbery	Gular	3
31	Moringaoleifera	Moringaceae	Sahjan	4
32	Araucaria araucana	Araucariaceae	Arocaria	20
33	Hyophorbelagenicau lis	Palm	Bottle Palm	63
34	Citrus X sinensis	Rutaceae	Naurangi	4
35	Grevillea robusta	Proteaceae	Silver Oak	5
36	Ziziphusmauritiana	Rhamnaceae	Ber	10
37	Prunuspersica	Rosaceae	Pears	5
38	Pyruspyrifolia	Rosaceae	Nakh	1
39	Prunusbokharensis	Rosaceae	Aloo Bukhara	2
40	Rosa	Rosaceae	Rose	90
41	Citrus limon	Rutaceae	Lemon	10
42	Citrus limetta	Rutaceae	Mausambi	7
43	Murrayakoenigii	Rutaceae	Curry Leaf	2
44	Populus	salicaceae	Poplar	32
45	Litchi chinensis	Sapindaceae	Litchi	4
46	Mimusopselengi	Sapotaceae	Maulsari	10

53	BugalBael	BugalBael	13
54	Dakein	Dakein	41
55	Citrus Reticulata	Rutaceae	Kinnow	14
56	Eriobotrya japonica	Apple	Loquat	2
57	Azadirachta indica	Meliaceae	Neem	35
58	Benguet Pine	Pinaceae	KesiyaJawaniya	1
59	Madhucal longifolia	Madhuca	Mahua	5
60	Saraca asoca	Caesalpinioideae	Pandoli Asoka	5
61	Dalbergia sissoo	Dalbergia	Tahli	3
62	Hibiscus	Malvaceae	ChiriPhool	1
63	Syzygium cumini	Myrtaceae	Jamun	11
64	Ficus carica	Moraceae	Anjeer	3
65	Annona squamosa	Annonaceae	SitaPhal	3
66	Ficus elastica	Moraceae	Rubber Plant	1
67	Morus alba	Rubus	Shahtoot	15
68	Litchi chinensis	Sapindaceae	Litchi	3
69	Artocarpus heterophyllus	Moraceae	Kathal	3
70	Solanum surattense Burm. F	Solanaceae	Koylas	85
71	Ficus religiosa	Moraceae	Peepal	4
72	Annona squamosa	Annonaceae	Sharifa	1
73	Astrophytum myriostigma	Cacti	Samer	17
74	Terminalia arjuna	Terminalia	Arjun	12
75	Musa acuminata	Musaceae	Banana	10
76	Mimusops elengi	Sapotaceae	Maulishree	97
77	Milletia pinnata	Pongamia	Sukhchain	4
78	Phoenix dactylifera	Arecaceae	Date	2
79	Toona ciliata	mahogany	Tund	51
80	Citrus limon Osbeck	Rutaceae	Lemon	17
81	Chukrasia tabularis	Meliaceae	Chakrasia	39
82	Phoenix canariensis	Arecaceae	Phoenix	10
83	Cassia fistula	Fabaceae	Amaltas	34
84	Eucalyptus	Myrtaceae	Safeda	48
85	Hibiscus rosa-sinensis	Malvaceae	Hibiscus	5
86	Carissa carandas	Apocynaceae	Karunda	5
87	Saraca asoca	Leguminosae	Sita Ashok	2
Total				2010

Green Audit Report, GNDEC, Ludhiana

In addition to above trees, in scared memory of Shri Guru Nanak Devji, Guru Nanak Scared Forest was also started in October, 2019 wherein 550 trees of 38 different varieties were planted to commemorate the 550th parkashpurab of Shri Guru Nanak Devji. The list of tree varieties is as below:

- 1 Arjun Terminalia Arjuna
- 2 Baheda Terminalia bellerica
- 3 Simbal Bombax ceiba
- 4 Banyan/ bargad Ficus Benghalensis
- 5 Desibabool/ desikikar Acacia nilotica
- 6 Desi Kadamb / desikadam Mitragyna Parviflora
- 7 Desi mango Magnifera indica
- 8 Dhak (Chichera)/ palash Butea monosperma
- 9 goolar Ficus racemosa
- 10 Harde / Harar Terminalia chebula
- 11 Jamun Syzygium cumini
- 12 Khejri/Jhand/Shammi Prosopis cineraria
- 13 Mahua Madhuca longifolia
- 14 Neem Azardichta Indica
- 15 Peepal Ficus Religiosa
- 16 Pilkhan / Pilkan Ficus virens
- 17 Rajain / Papdi/ chudelpapdi Holoptelea integrifolia
- 18 Sheesham Dalbergia Sissoo
- 19 Suhanjana Moringa concanensis
- 20 White siris Albizia procure
- 21 Amaltas Cassia fistula
- 22 Ber Ziziphus Mauritiana
- 23 harshingar/ parijat Nycanthes arbortristis
- 24 Karanj / Sukhchain Pongamia pinnata
- 25 khair/ Katha Acacia catechu
- 26 Lasora Cordia dichotoma
- 27 Tota Erythrina Indica
- 28 Aak Caliotropis procure
- 29 Anar Punica Granatum
- 30 Mehndi Lawsomia Inermis
- 31 Motia Jasminum Sambac
- 32 Falsa Grewia asiatica
- 33 Karonda Carissa Carandas
- 34 Khatta Citrus Aurantium
- 35 Jhar Ber Ziziphus Nummelaria
- 36 Ashvagandha Withania Somnifera
- 37 Jangli Falsa Grewia Tenex
- 38 Garna/ Jangli Karonda Carissa Spinorum



Photo 4: Main Entry of College Campus



Photo 5: Aerial View of College



Photo 6: Main Gate Entry point of college



Photo 7: Green Campus

FAUNAL DIVERSITY IN GNDEC CAMPUS:

GNDEC is located in Ludhiana District of Punjab. Ludhiana is an industrial city known for hosiery, cycles and sewing machines. It has got extreme climates. The highest temperature is recorded 44⁰ C just prior to the onset of monsoon (around May- early June). Summer rain is normal, and is principally caused from late July to August by the moisture-laden South-West Monsoon, on striking the Himalayan foothills of the north. The climatic condition of the Ludhiana district as a whole and GNDEC in particular is very suitable for a wide variety of flora and fauna to support its rich biodiversity. The faunal Diversity of GNDEC campus has been studied and documented as below:

Table: Common and Scientific names of birds and animals

S.No	Common Name	Scientific Name
1.	Common Myna	Acridotheres Tristis
2.	Bank Myna	Acridotheres Ginginianus
3.	House Sparrow	Passer Domesticus
4.	House Crow	Corvus Splendens
5.	Cuckoo	Cuculidae
6.	Snake	Naja Naja
7.	Yellow Wasp	Ropalidia Marginata
8.	Butter Fly	Danaus Genutia
9.	Common Woodshrike	Tephrodornis Pondicerianus
10.	Pied Myna	Gracupica Contra
11.	Red-Vented Bulbul	Pycnonotus Cafer
12.	Skylark	Aluda Gulgula
13.	Garden Tiger Moth	Arctia Caja
14.	Little Owl	Athene Brama
15.	Oleander Moth	Syntomeida Epilais
16.	Slender Skimmer	Orthetrum Sabina



Photo 8: Common Myna(AcridotheresTristis)
Courtesy: Photography Club, GNDEC



Photo 9: House Sparrow (PasserDomesticus)
Courtesy: Photography Club, GNDEC



Photo 11: House Crow(CorvusSplendens)



Photo 12: Cuckoo(Cuculidae)



Photo 13: Snake(NajaNaja)



Photo 14: Yellow Wasp (RopalidiaMarginata)



Photo 15: Butter Fly(DanausGenutia)
Courtesy: Photography Club, GNDEC



Photo 16: Beetle insect on a hibiscusflower
Courtesy: Photography Club, GNDEC



Photo 17: Common Woodshrike
(Tephrodornis Pondicerianus)



Photo 18: Pied Myna (Gracupica Contra)
Courtesy: Photography Club, GNDEC



Photo 19: Red-Vented Bulbul (Pycnonotus Cafer)



Photo 20: Skylark (Aluda Gulgula)



Photo 21: Garden Tiger Moth(ArctiaCaja)



Photo 22: Little Owl (AtheneBrama)
Courtesy: Photography Club, GNDEC



Photo 23: Oleander Moth(SyntomeidaEpilais)



Photo 24: Slender Skimmer (OrthetrumSabina)

WEATHER DATA OF Ludhiana and GNDEC:

Station: Ludhiana (INDIA (STATIONS NORTH OF LATITUDE 20~N)) Location:

30.6435° N, 76.3970° E

In Ludhiana, the climate is warm and temperate. The summers are much rainier than the winters in Ludhiana. The average annual temperature in Ludhiana is 24.3 °C. and precipitation level is about 770 mm.

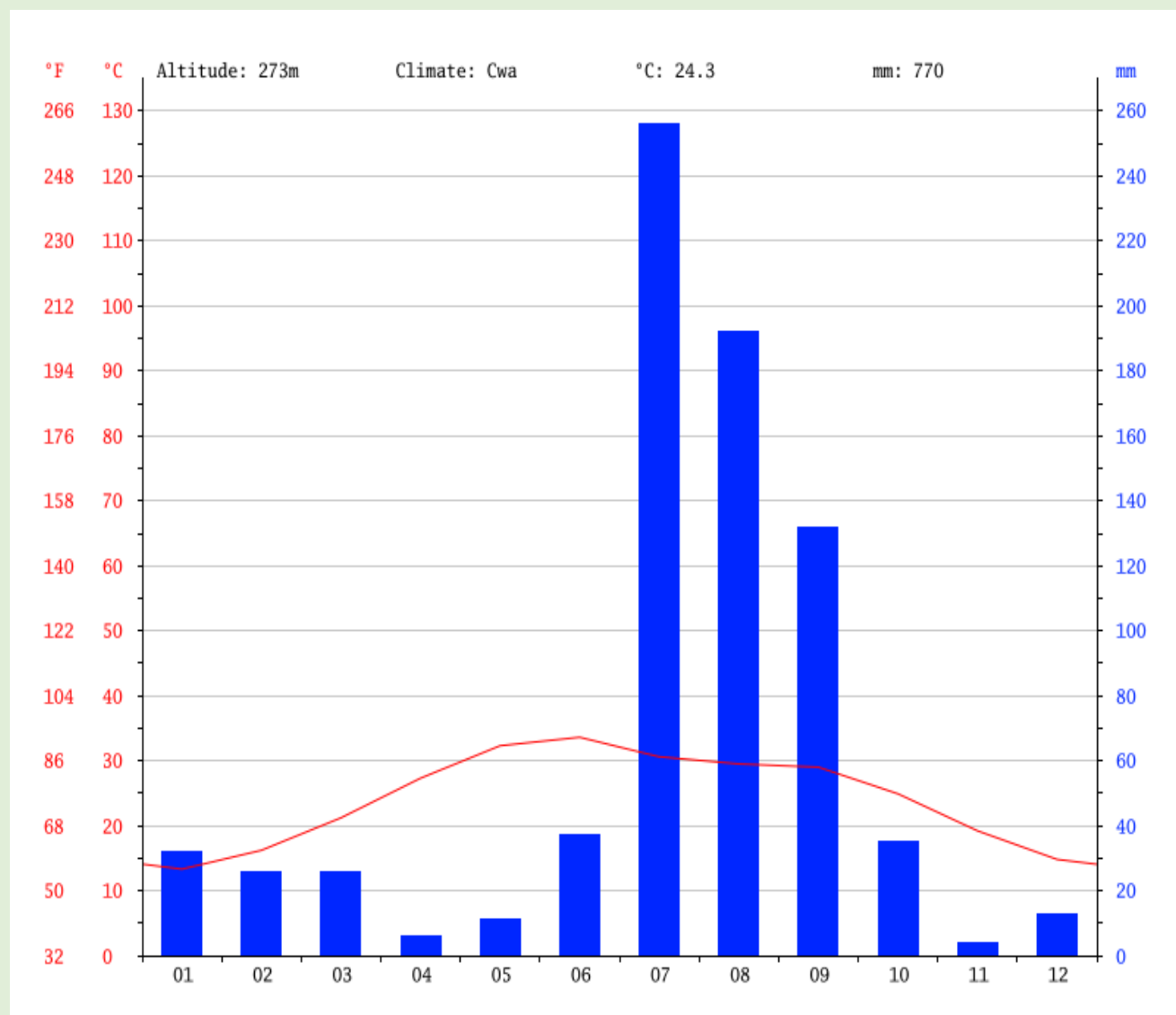
The driest month is generally November. There is 4 mm of precipitation in November. The greatest amount of precipitation occurs in July, with an average of 256 mm. With an average of 33.6 °C, June is the warmest month. The lowest average temperatures in the year occur in January, when it is around 13.3 °C. The precipitation varies 252 mm between the driest month and the wettest month. The variation in temperatures throughout the year is 20.3 °C.

WEATHER DATA MONTH WISE Ludhiana (Source: Google)

Temperature\Month	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temp. (°C)	13.3	16.2	21.2	27.3	32.3	33.6	30.6	29.5	29	24.9	19.2	14.8
Min. Temp (°C)	6.6	8.9	13.5	19	24.2	26.9	26.2	25.5	23.6	17.2	10.3	6.9
Max. Temp (°C)	20.1	23.6	29	35.7	40.4	40.4	35.1	33.6	34.5	32.7	28.2	22.8
Avg. Temp (°F)	55.9	61.2	70.2	81.1	90.1	92.5	87.1	85.1	84.2	76.8	66.6	58.6
Min. Temp (°F)	43.9	48.0	56.3	66.2	75.6	80.4	79.2	77.9	74.5	63.0	50.5	44.4
Max. Temp (°F)	68.2	74.5	84.2	96.3	104.7	104.7	95.2	92.5	94.1	90.9	82.8	73.0
Precipitation / Rainfall (mm)	32	26	26	6	11	37	256	192	132	35	4	13

The likes of an alluvial plain are strong characteristics of the city of Ludhiana and its surroundings. The city does have a Central location in the plan region. The geographical co-ordinate of Ludhiana are 30.6435° N, 76.3970° E. The city has an average altitude of 808 feet or 246 meters from the average sea level. The erstwhile land of Ludhiana was very much feasible for peanut cultivation with sand dunes. However a lot of irrigation and environmental changes have made the land more viable for wheatcultivation.

The climatic conditions bear a strong resemblance with the other cities in the northern part of India. The summers are usually very hot and the winters are very cold. The summers are prevalent during the months of April to September with June, July, August till mid September being the hottest months. The winter is prevalent from the month of November till the month of March. There is onset of Monsoon in September and from mid of September till November one experiences the transitional weather.

CLIMATE GRAPH MONTH WISE Ludhiana**AIR QUALITY IN LUDHIANA AND GNDEC:**

The ambient air quality data for Ludhiana and GNDEC for the last one year shows that there are very less polluted particles in ambient air; AQI for SO₂ & NO_x parameters are within the range of Indian living standards, there are a number of factors responsible for this cleanliness, calmness and serenity in this area. Firstly, population which is most responsible for all the problems and hurdles in smooth living is lowest here of all the districts of Punjab. Secondly, in this area more trees have been planted as compared to other cities. Furthermore, no air polluting industry is established near here.

Therefore, the ambient air quality of Ludhiana Area falls in between moderate to rich quality state. The Punjab Pollution Control Board is pondering over the various possibilities to reduce the air pollution for the improvement of ambient air quality with respect to AQI is concerned. However, the annual average value of PM₁₀, SO₂, NO_x in the ambient air quality of Ludhiana city falls in the range of 50-62 µg/m³, 3-5 µg/m³, 10-12 µg/m³ for most of the months, as such, the graded response action plan to eradicate the problem

AIR QUALITY DETERMINATION

Satisfactory air quality index (OVERALL=58) in Ludhiana, Punjab, India on dated 27th September 2019:

Parameter	Result (Range)
NO ₂	25.4 µg/m ³ , AQI 26 Very Good
NO	10.09 µg/m ³ , AQI 10 Good
O ₃	31.49 µg/m ³ , AQI 31 Good
PM _{2.5}	28.13 µg/m ³ , AQI 28 Good
PM ₁₀	77.2 µg/m ³ , AQI 79 S a t i s f a c t o r y
CO	35.0 µg/m ³ , AQI 18
Humidity	56.0 %
Barometric Pressure	1013 millibar or hPa
Wind Speed	10-15 m/s
Wind Direction	28.0013 degrees
Sun Rise	06:28 AM
Sun Set	05:56 PM
Moonrise	07:05 PM
Moonset	07:31 AM

WATER ANALYSIS REPORT OF GNDEC:

(Courtesy: Consultancy Cell, GNDEC)

Water quality testing is important because it identifies contaminants and prevents water-borne diseases. Drinking or using contaminated water can result in severe illness or death. That is why it is important to ensure that drinking water is safe, clean and free from bacteria and disease.

The parameters for water quality are determined by the intended use. Work in the area of water quality tends to be focused on water that is treated for human consumption, or in the environment.

Drinking water indicators:

The following is a list of indicators often measured by situational category:

- Alkalinity
- Color of water
- pHvalue
- Taste and odor (geosmin, 2-Methylisoborneol (MIB),etc.)
- Dissolved metals and salts (sodium, chloride, potassium, calcium, manganese, magnesium)
- Microorganisms such as fecal coliform bacteria (*Escherichia coli*), *Cryptosporidium*, and *Giardia lamblia*; see Bacteriological wateranalysis
- Dissolved metals and metalloids (lead, mercury, arsenic,etc.)
- Dissolved organics: colored dissolved organic matter (CDOM), dissolved organic carbon(DOC)
- Heavymetals



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 "A" Grade NAAC Accredited, Punjab Govt. Aided Status, ISO: 9001 : 2008 Certified
 Gill Park, Gill Road, Ludhiana - 141006 Lat 30° 51' 29" N Lon 75° 51' 39" E
 Ph.: 0161-2451133, 5064509 Website: <http://tcc.gnec.ac.in> E-mail: tcc@gnec.ac.in

GNDEC/TCC/10/997

Dated: 23-10-2018

To: Principal,
 Guru Nanak Dev Engineering College, Gill Park Gill Road,
 Ludhiana.

Sub: Analysis of water samples for drinking purposes, (Water Cooler Near Library at GNDEC, Ludhiana)

Sit: The result of water samples sent by you are as under:

Parameters	Water Cooler Near Library	Permissible Limits as
pH	7.30	6.5-8.5
Colour, (Hazen Units)	<5	<5 Hazen Units
Taste & Odour	Agreeable	Agreeable or Objectionable
TDS (mg/l)	280	500
Turbidity (NTU)	<1	1.0
Chlorides, Cl ⁻ (mg/l)	15	250
Sulphates (SO ₄ ²⁻) (mg/l)	48	200
Nitrates, NO ₃ ⁻ (mg/l)	5.48	45
Total Hardness (as Ca CO ₃) (mg/l)	225	300
Fluoride (mg/l)	0.62	1.0
Iron, (mg/l)	Nil	0.3
Manganese, (mg/l)	Nil	0.1
Calcium, Ca ²⁺ (mg/l)	25.0	75
Magnesium, Mg ²⁺ (mg/l)	16	30
Copper, Cu (mg/l)	0.12	0.5
Zinc, (mg/l)	Nil	5
Chromium, (mg/l)	Nil	0.05
Total Coliform	Zero	Zero
Fecal Coliform	Zero	Zero

Water samples are fit for drinking purpose.

Conditions:

This test report refers only to the samples submitted for the test.

This test shall not be used for any sales promotions or advertisements without permission.

This test report is not to be used for legal purpose & will not be produced in the Court of Law

[Signature]
 Dr. [Name] & Consultancy

NOISE LEVEL IN THE SURROUNDING OF GNDEC:

The human ear is constantly being assailed by man-made sounds from all sides, and there remain few places in populous areas where relative quiet prevails. There are two basic properties of sound:

- Loudness and
- Frequency.

Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-80 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city. For international standards a noise level up to 65 dB is considered tolerable. Loudness is also expressed in sones. One sone equals the loudness of 40 dB sound pressure at 1000 Hz. Frequency is defined as the number of vibration per second. It is denoted as Hertz(Hz).

MATERIALS, STUDY AREA & METHODS

Noise level meter or noise measuring app, Noise test pro (version: 1.0.2), was used to measure the noise level. Noise test pro detects any noise, music or sound in your surroundings. It will tell you maximum, minimum and average decibels.

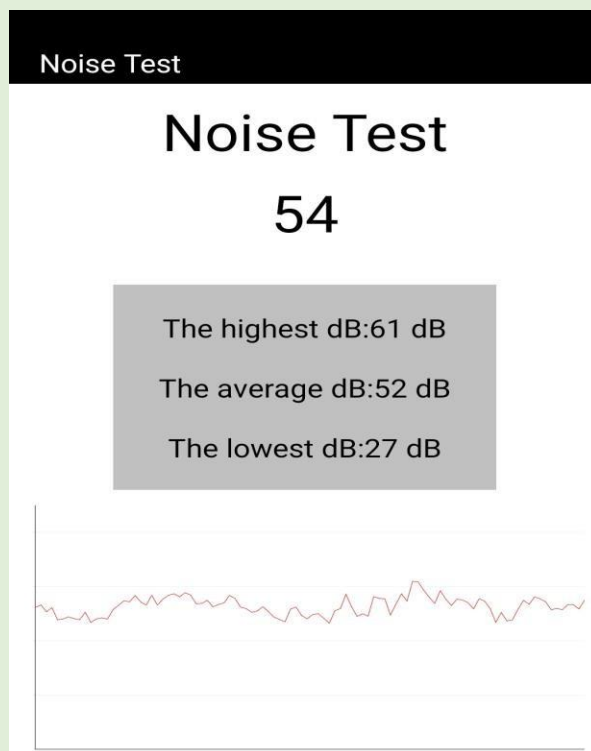


Figure: Noise Measurement by Noise Test Pro App

DESCRIPTION OF THE COLLEGE SITE

The site of the GNDEC is bounded to the North by Nankana Sahib Public School & Sub Registrar Office, Residential properties to the East, Gill road with various book stalls, shops, restaurants, hawkers etc., to the West by a side road and to the south by the faculty residences & further canal. Below photo shows the satellite image of the college site.

MEASUREMENT PROCEDURE

The noise level was recorded at the different Important Locations of GNDEC, LUDHIANA. At each spot, the measurements were taken for 60 seconds during day time (6 AM- 6 PM) and noted down the measurements. Screen shots of the measurements of noise were taken immediately on the app at the time of 60th second of each measurement.

RESULTS

The results of the experiments at different places have been tabulated in the following table:

Table 1: Measurements of Noise in and around GNDEC:

<i>PLACE</i>	<i>MEASUREMENTS (Duration in Sec.)</i>	<i>MINIMUM (dBA)</i>	<i>Maximum (dBA)</i>	<i>AVERAGE (dBA)</i>
Civil Dept Area	60	53	81	76
Civil Dept Office	60	50	68	56
Civil Lab	60	59	74	70
Canteen	60	74	90	85
Library	60	51	85	65
Mechanical Dept Area	60	57	84	78
Mechanical Lab	60	45	89	72
CSE Dept Area	60	50	81	73
CSE Lab	60	66	85	76
EE Dept Area	60	66	87	76
EE Lab	60	40	87	68
ECE Dept. Area	60	63	82	76
ECE Lab	60	65	85	78
Principal Office	60	35	77	68
Auditorium	60	53	75	71
Workshop	60	66	90	78
Swimming Pool	60	56	86	69
Ground 1	60	59	90	70
Ground 2	60	56	90	68
Generator Room	60	53	89	75
Gymnasium	60	68	82	76
Faculty Flats	60	35	80	69
Staff Flats	60	49	71	65
Guest House	60	50	77	67
College Front Gate	60	50.7	78.0	71.0
College Back Gate	60	54	75.9	73.5
Boys Hostel	60	54	68	62
Girls Hostel	60	52	90	68

Source: Data collected by Students of 5th Semester, Department of Electrical Engineering. After the study, the measurements of noise have been recorded in and outside of GNDEC area:

Inside the Campus: 35-90 dBA,

Outside the Campus: 54-93 dBA

WASTE DISPOSAL OF GNDEC:

Waste disposal are the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.

The waste from all around the college is separated daily as wet and dry waste in different bags which are disposed separately. Dry waste includes paper, cardboard, glass tin cans etc. on the other hand; wet waste refers to organic waste such as vegetable peels, left-over food etc. Separation of waste is essential as the amount of waste being generated today causes immense problem. The material was composted and evaluated as a fertilizing material. Disposal of these waste results in the production of good quality organic manure that can be used as soil amendments and source of plant nutrients.

With smart initiatives like “Think Green Campus Model”, waste management is helping colleges and universities to achieve a higher level of environmental performance. By reusing or recycling we are contributing to the conservation of natural resources, saving energy, helping to protect the environment, reducing landfill. We will also reduce our impact on the environment by minimizing the carbon emissions associated with both disposing of old products and obtaining new ones. GNDEC adopts environment friendly practices and takes necessary actions such as – energy conservation, waste recycling, carbon neutral etc. The biological reusable waste are processed as organic manure for the plants available in the college campus and the other solid waste generated in the college campus is taken to the community bin of Ludhiana municipality for recycling and disposal.



Pic. (A)

Waste collection tank for preparation of manure



Pic. (B)

Organic compost prepared in college campus



Pic (C): Waste treatment centre (work in progress)

TRANSPORTATION AT GNDEC:

Being a largest campus in the region and located centrally, GNDEC faculty, staff and students commute on their own. The college is dedicated to provide its students and staff all the comfort and convenience to help them to achieve their targets. The students are encouraged to use cycles, two wheelers rather than four wheelers which leads to fuel saving and also the contribution of pollutants to atmosphere is less.

ELECTRICAL POWER CONSUMPTION AT GNDEC:

GNDEC, being one of the largest colleges of Punjab, consumes on an average 45249 kW- hr (units) of electricity which turns out to be 542988 kW-hr per year only to maintain its volumetric activities throughout the year. As a policy decision, the authority keeps on replacing the old filament bulbs, CFL bulbs and tube lights by low energy consuming LED bulbs and LED tubes and bulky high-power consuming fans by energy efficient fans in order to keep the electricity consumption of the college as low as possible.

In addition to making Environmental Studies a very vital subject in our syllabus, GNDEC, Ludhiana has gone a step further by putting that theory into practice. The college has installed two sets of solar panels having a capacity of 200kWp, one on MBA Block, other on Administrative block. The energy from this solar installation is helping offset the institute's daytime peak electricity demand from the grid. GNDEC with the installation of 200 kWp grid connected solar rooftop plant under capex mode was able to **offset 24% of its energy usage from the state grid** thus moving towards a more reliable and greener option and **reducing its carbon footprint**.

Percentage of annual power requirement of the Institution met by the renewable energy sources

Response: 24%

Annual power requirement met by the renewable energy sources (in kWh)

Response: 264000

Total annual power requirement (in kWh)

Response: 542988

Power Requirements met by renewable energy Sources	Total Power Requirements	Renewable energy Source	Renewable energy generated and used	Energy supplied to the grid
264000kWh/year	542988 kWh/Year	Solar	264000 kWh/year	NIL



Fig: Grid Connected Solar PV plant on MBA block Rooftop (50+50kWp)



Fig: Grid connected Solar PV Plant on Administrative Block

Percentage of annual lighting power requirements met through LED bulbs

Response: 29.1%

Annual lighting power requirement met through LED bulbs (in kWh)

Response: 45298

Annual lighting power requirement (excluding LED)(in kWh)

Response: 110367

Total Annual Lighting Power Requirements = 155665 kWh

Total Lighting Requirements	Percentage Lighting through LED Bulbs	Percentage Lighting through other sources
155665 kWh /Year	29.1%	70.9%

EXPENDITURE ON GREEN INITIATIVES DURING THE LAST FIVE YEARS:

Financial Year	Tree plantation (Amount in Rs)	Gardening & lawn Work (Tractor Running & Maintenance)	Sewerage Treatment Plant	Purchase of LED's	Solar PV	Total (In Rupees)
2018 - 2019	13936/-	145048/-	16657/-	10164/-	-	185805/-
2017 - 2018	103564/-	143458/-	15850/-	12740/-	6750000/	7025612/-
2016 – 2017	78945/-	186018/-	32159/-	15450/-	3020500/	3333072/-
2015 – 2016	87728/-	130725/-	50758/-	---	150000/-	419211/-
2014 - 2015	92119/-	115347/-	44000/-	---	-	251466/-