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Paper on energy conservation of building.

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ABSTRACT

Green buildings have been described as being designed, constructed, operated, and maintained (and also demolished) to have a minimal negative impact on the environment, including the indoor environment of the building .In this paper we assessed the environment life cycle on the basis of designed, constructed, operated and maintained.
And relating all the parameters with the effect on the health in life.

INTRODUCTION

Green buildings have been described as being designed, constructed, operated, and maintained (and also demolished) to have a minimal negative impact on the environment, including the indoor environment of the building (Italiano 1994). In terms of the global environment, this can be achieved by employing some form of environmental life-cycle assessment of all components and resources involved with constructing, operating, and maintaining a building (Lippiatt and Norris 1995). In tenns of the indoor environment, this means employing building materials, maintenance products and practices, and operating strategies that provide acceptable indoor air quality (IAQ) to building occupants. In many discussions of green buildings, there is an implication that an exceptionally good indoor environment is being provided, but the specific characteristics of the air that make it exceptional are typically not stated. In fact, while a general consensus may exist on some aspects of good indoor air quality practices (EPA 1991; Levin 1991), much remains to be done in defining the details of “good” indoor air quality. However, there is a general consensus on what constitutes good practice. The major shortcomings in specifying good indoor air quality are the lack of standardized measurement techniques for the concentrations of most pollutants and for pollutant emission rates, the myriad of contaminants that can exist within the built environment and the need for more information on the health effects related to these contaminants.

GENERAL

Green Building, also known as green construction or sustainable building, is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation

A similar concept is natural building, which is usually on a smaller scale and tends to focus on the use of natural materials that are available locally. Other related topics include sustainable design, green architecture, and energy efficient buildings.

The green building movement originated due to need and desire for more energy efficient and environmentally friendly construction practices. There are a number of motives to building green, including environmental, economic, and social benefits. However, modern sustainability initiatives call for an integrated and synergistic design to both new construction and in the retrofitting of an existing structure. Also known as sustainable design, this approach integrates the building life-cycle with each green practice employed with a design-purpose to create a synergy amongst the practices used.

Green building brings together a vast array of practices and techniques to reduce and ultimately eliminate the impacts of buildings on the environment and human health. It often emphasizes taking advantage of renewable resources, e.g., using sunlight through passive solar, active solar, and photovoltaic techniques and using plants and trees through green roofs, rain gardens, and for reduction of rainwater run-off. Many other techniques, such as using packed gravel or permeable concrete instead of conventional concrete or asphalt to enhance replenishment of ground water, are used as well. While the practices, or technologies, employed in green building are constantly evolving and may differ from region to region, there are fundamental principles that persist from which the method is derived: Siting and Structure Design Efficiency, Energy Efficiency, Water Efficiency, Materials Efficiency, Indoor Environmental Quality Enhancement, Operations and Maintenance Optimization, and Waste and Toxics Reduction. The essence of green building is an optimization of one or more of these principles. Also, with the proper synergistic design, individual green building technologies may work together to produce a greater cumulative effect. On the aesthetic side of green architecture or sustainable design is the philosophy of designing a building that is in harmony with the natural features and resources surrounding the site. There are several key steps in designing sustainable buildings: specify 'green' building materials from local sources, reduce loads, optimize systems, and generate on-site renewable energy.

Demand for energy is increasing day by day and is likely to increase in tune with industrialization / urbanization. Building consumes more than 30% of total energy consumption and hence the demand is to conserve energy in several ways by all means. Amongst the various application of energy of the buildings and utilization of day lighting, is perhaps the most direct and simple option as well as most desirable one in view of high-energy consumption for these applications.

In this thesis it has been tried to quantify the energy saving in the Building of IIMT college of Engineering, Greater Noida. Temperature and Relative Humidity were measured daily of two hours intervals (7.00 am to 6.00 pm) for four months (April-2015 to July-2015) of referents locations of the college buildings. This study is of limited in nature, and to have definite conclusion, it should be extended to several buildings, it is recommended to green building concepts.

Thermal Comfort: Several environmental parameters were measured within the building to characterize thermal comfort. Thee measured parameters were temperature, relative humidity, and percent predicted dissatisfied (PPD). The result of the thermal comfort measurements are presented in Table 5 as the average measured values for a morning and an afternoon set of measurements performed on each of the two days of sampling. Each value shown in the table is the average of between two and six measurements taken throughout the entire zone. Temperature was fairly uniform throughout all zones, as indicated by the fact that standard deviations (not shown in the table) of each set of measurements were always within 4.5% of the average, and all measurements were between 20ºC (68°F) and 27°C (74.6°F). The relative humidity was between 25% and 35%. All of the PPD measurements were below 10%, which is indicative of acceptable conditions for thermal comfort based on the assumptions of clothing and activity levels used in performing the measurements.

STATION: IIMT college of Engineering .Greater Noida
Daily average Temp (°C), RH (%) for the month of April-2015

Date	Daily Average Temp°.C	Daily average RH (%)
01.04.2015	27.5	39
02.04.2015	27	38
03.04.2015	28.5	32
04.04.2015	28	37
05.04.2015	30	26
06.04.2015	30.5	34
07.04.2015	28.4	35
08.04.2015	30.5	27
09.04.2015	31	31
10.04.2015	32.5	33
11.04.2015	31.5	30
12.04.2015	35	29
13.04.2015	30.5	30
14.04.2015	32.5	33
15.04.2015	33	33
16.04.2015	30	38
17.04.2015	37	39
18.04.2015	36	37
19.04.2015	37	37
02.04.2015	36	41
21.04.2015	36.5	33
22.04.2015	35.5	51
23.04.2015	34.5	39
24.04.2015	33	40
25.04.2015	33.5	40
26.04.2015	33	41
27.04.2015	34	30
28.04.2015	32.5	30
29.04.2015	34	33
30.04.2015	36	37

Table-3.31

Study area: IIMT college of Engineering ,Greater Noida.

Daily average temperature (°C) and relative humidity (%) for the month of April-2015

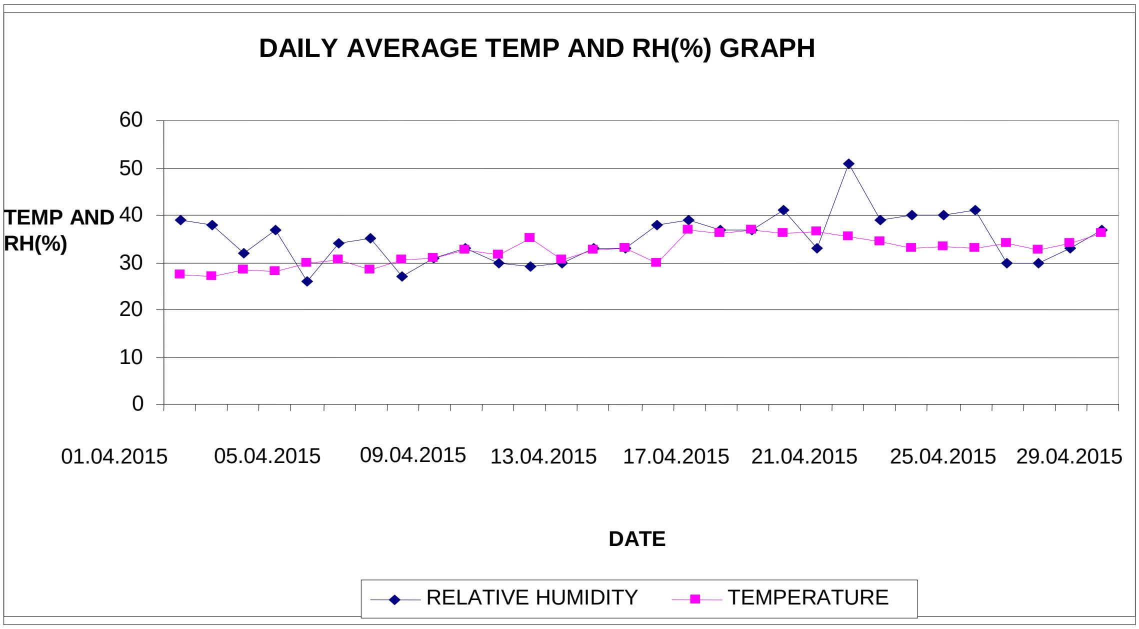

Figure-3.1

Study area: IIMT college of Engineering ,Greater Noida.

Daily average temperature (°C) and relative humidity (%) for the month of April-2015

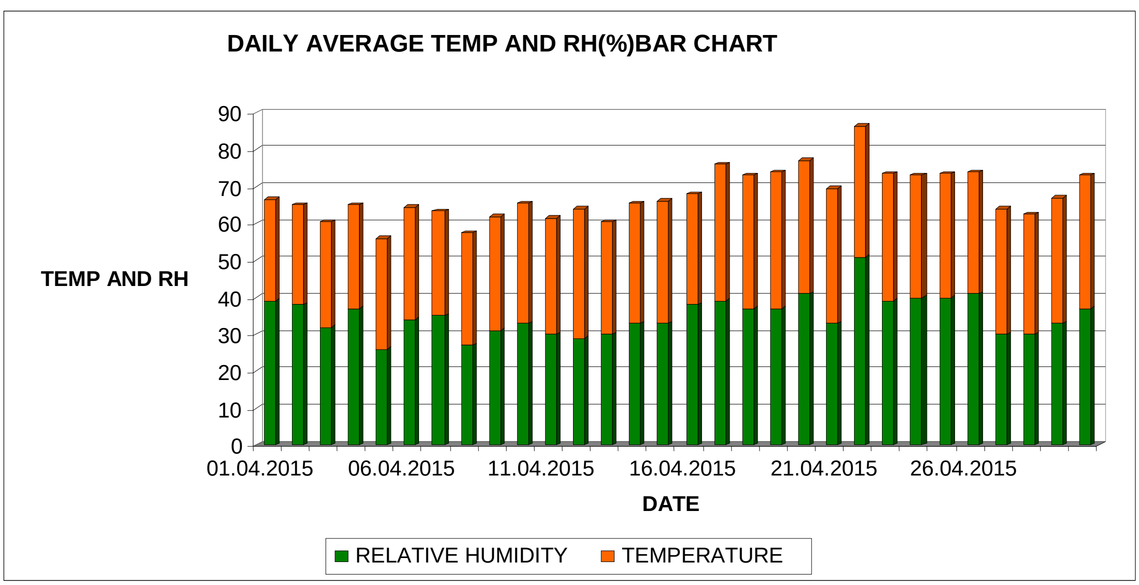

Figure-3.2

Station: IIMT college of Engineering ,Greater Noida.
Daily average Temp (°C), RH (%) for the month of May-2015

Date	Daily Average Temp. º C	Daily Average RH (%)
01.05.2015	36	38
02.05.2015	35.5	44
03.05.2015	35.5	38
04.05.2015	36	38
05.05.2015	36	38
06.05.2015	38	50
07.05.2015	35	57
08.05.2015	32.5	42
09.05.2015	34	38
10.05.2015	36	40
11.05.2015	37	42
12.05.2015	35.5	37
13.05.2015	37.5	33
14.05.2015	40	25
15.05.2015	39	23
16.05.2015	39	32
17.05.2015	38	26
18.05.2015	40	34
19.05.2015	39.5	34
20.05.2015	38	26
21.05.2015	39	28
22.05.2015	38.5	25
23.05.2015	39	31
24.05.2015	39	40
25.05.2015	37.5	27
26.05.2015	40	20
27.05.2015	40	33
28.05.2015	39	40
29.05.2015	33.5	33
30.05.2015	35.5	31
31.05.2015	35.5	24

Table-3.63

Study area: IIMT college of engineering ,Greater Noida.
Daily average temperature (°C) and relative humidity (%) Graph for the month of May-2015

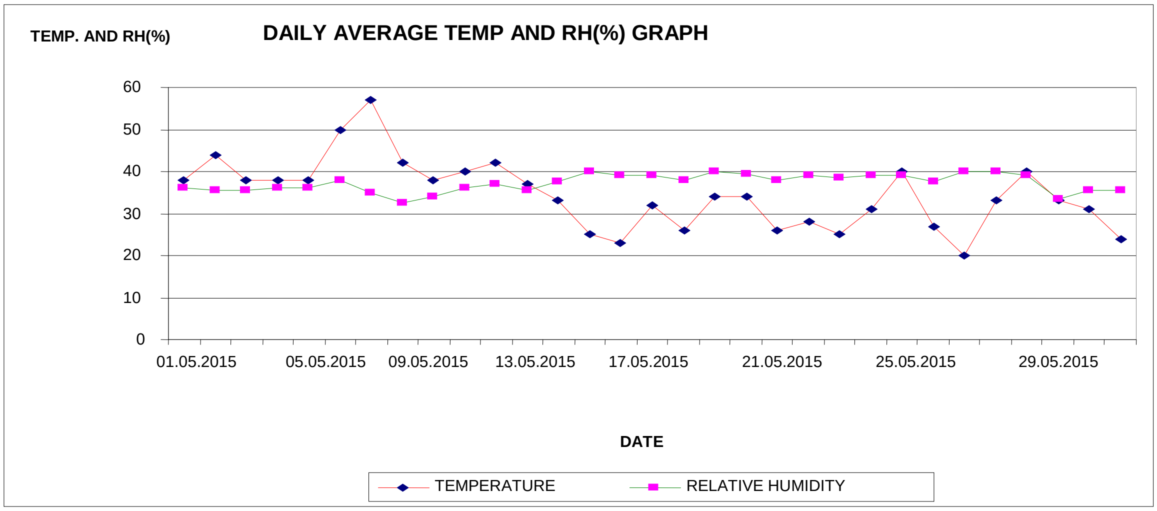

Figure-3.3

Study area: IIMT college of Engineering ,Greater Noida.
Daily average temperature (°C) and relative humidity (%) Bar Chart for the month of May-2015

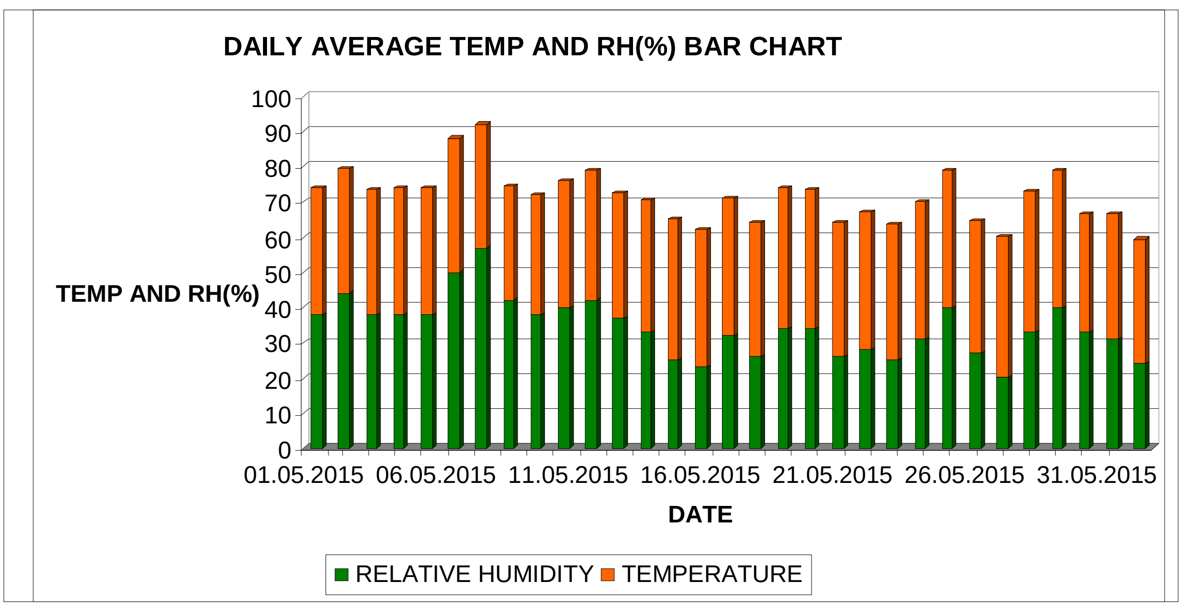

Figure-3.4

Station:IIMT college of Engineering .Greater Noida
Daily average Temp (°C), RH (%) for the month of June-2015

Date	Daily Average Temp. º C	Daily Average RH (%)
01.06.2015	40.5	13
02.06.2015	40.5	20
03.06.2015	39	22
04.06.2015	39	37
05.06.2015	35.5	42
06.06.2015	36	32
07.06.2015	35	43
08.06.2015	31.5	70
09.06.2015	34.5	41
10.06.2015	35.5	28
11.06.2015	37.5	27
12.06.2015	38.5	29
13.06.2015	37	28
14.06.2015	40.5	50
15.06.2015	39	25
16.06.2015	36.5	35
17.06.2015	38.5	26
18.06.2015	40	34
19.06.2015	41.5	21
20.06.2015	40.5	20
21.06.2015	41.5	28
22.06.2015	40	19
23.06.2015	40	20
24.06.2015	39	35
25.06.2015	33	48
26.06.2015	38	75
27.06.2015	38	71
28.06.2015	34	84
29.06.2015	37.5	80
30.06.2015	37	83

Table-3.94

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Daily average temperature (°C) and relative humidity (%) for the month of June-2015

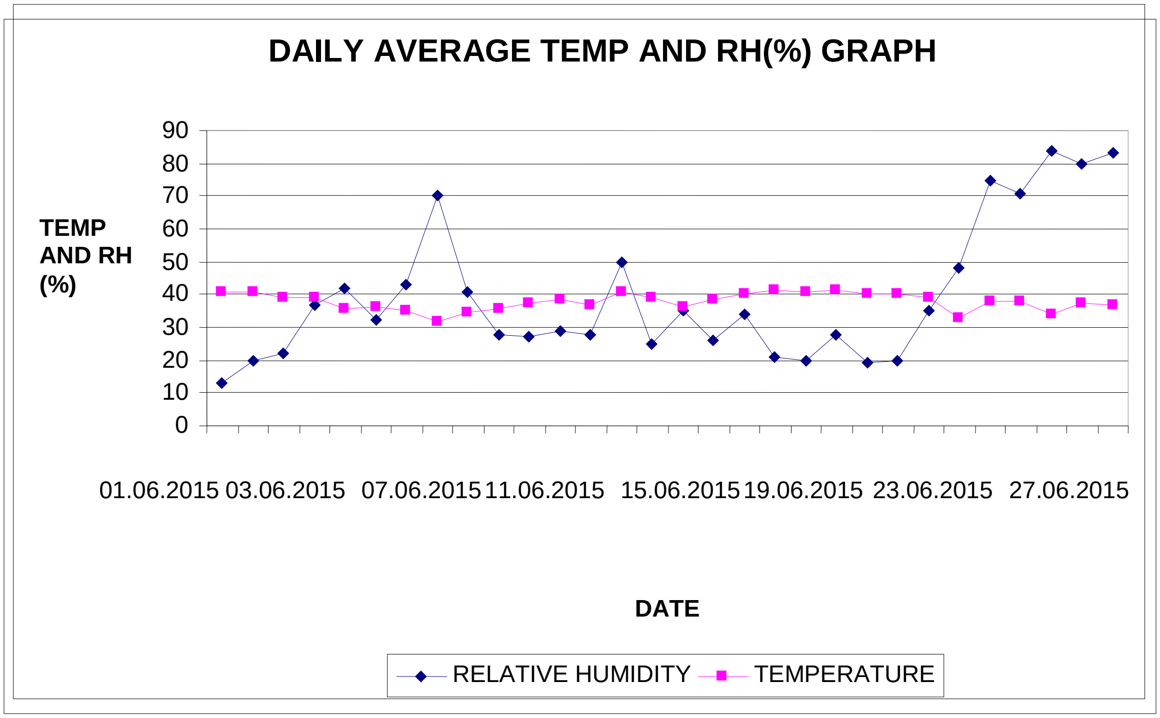

Figure-3.5

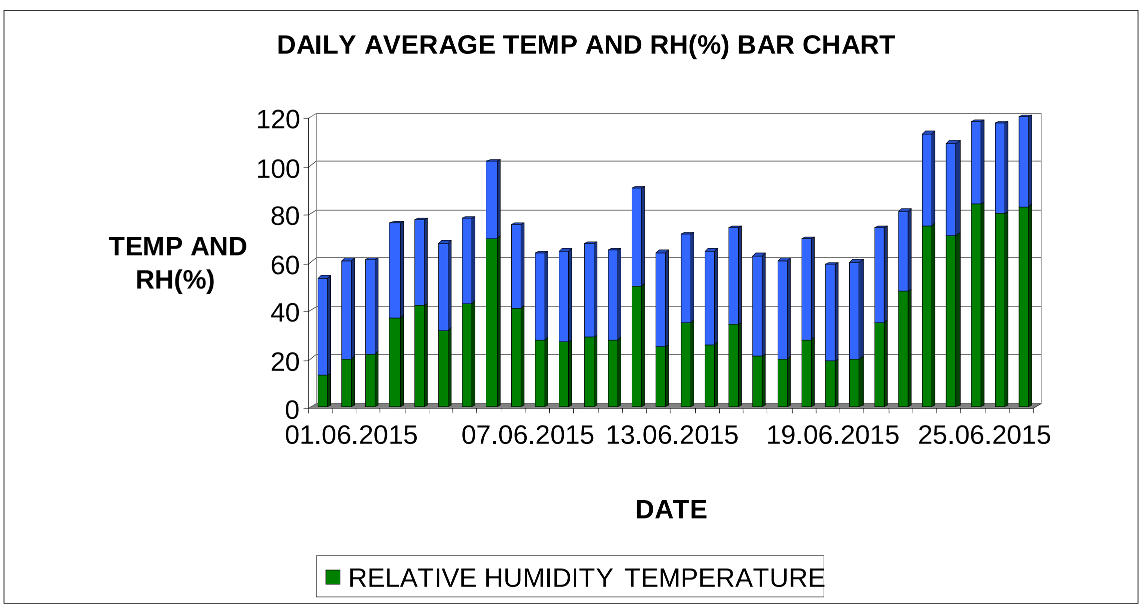

Figure-3.6

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Station: IIMT college of Engineering, Greater Noida
Daily average Temp (°C), RH (%) for the month of July-2015.

Date	Daily Average Temp. º C	Daily Average RH (%)
01.07.2015	36.5	76.5
02.07.2015	37	80
03.07.2015	35.5	83
04.07.2015	31	87
05.07.2015	29	88
06.07.2015	32	90
07.07.2015	35	87
08.07.2015	36	85
09.07.2015	38	73
10.07.2015	38.5	78
11.07.2015	34.5	85
12.07.2015	33.5	86
13.07.2015	32.5	90
14.07.2015	35.5	86
15.07.2015	34	89
16.07.2015	36	87
17.07.2015	34.5	88
18.07.2015	36	87
19.07.2015	32	93
20.07.2015	29	95
21.07.2015	31.5	91
22.07.2015	32.5	85
23.07.2015	34	71
24.07.2015	35.5	83
25.07.2015	32	88
26.07.2015	36	84
27.07.2015	30	95
28.07.2015	33	91
29.07.2015	35	86
30.07.2015	38.5	91
31.07.2015	28.5	95

Table-3.126

Daily average Temperature (°C), Relative Humidity (%) for the month of July-2015

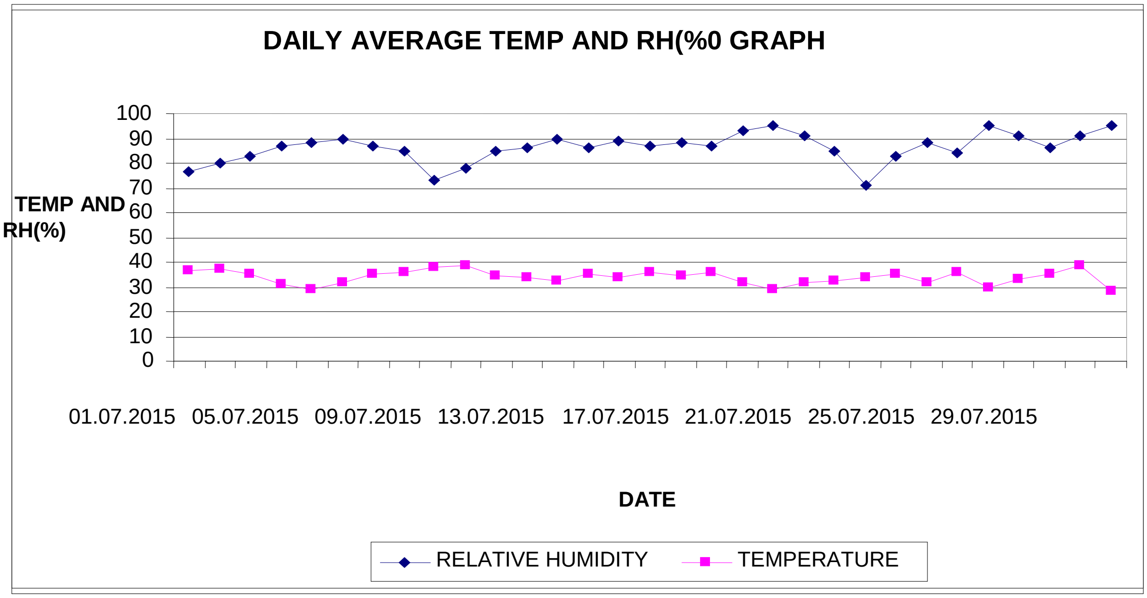

Figure-3.7

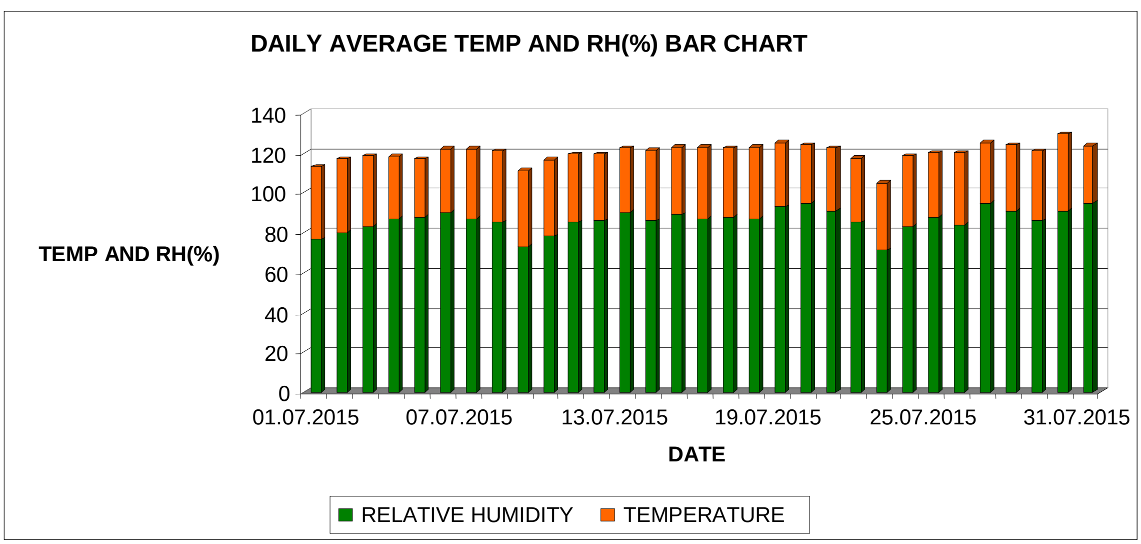

Figure-3.8

STATION: IIMT college of Engineering, Greater Noida

Monthly Average Temperature (°C) and Relative Humidity (%) from April-2015 to July-2015

Month	Monthly Average Temp °C	Monthly Average RH (%)
April-2015	32.5	35
May-2015	36	34
June-2015	38	40
July-2015	34	86

Table-3.127

Monthly Average Temperature °C and Relative Humidity (%) Graph from April-2015 to July-2015.

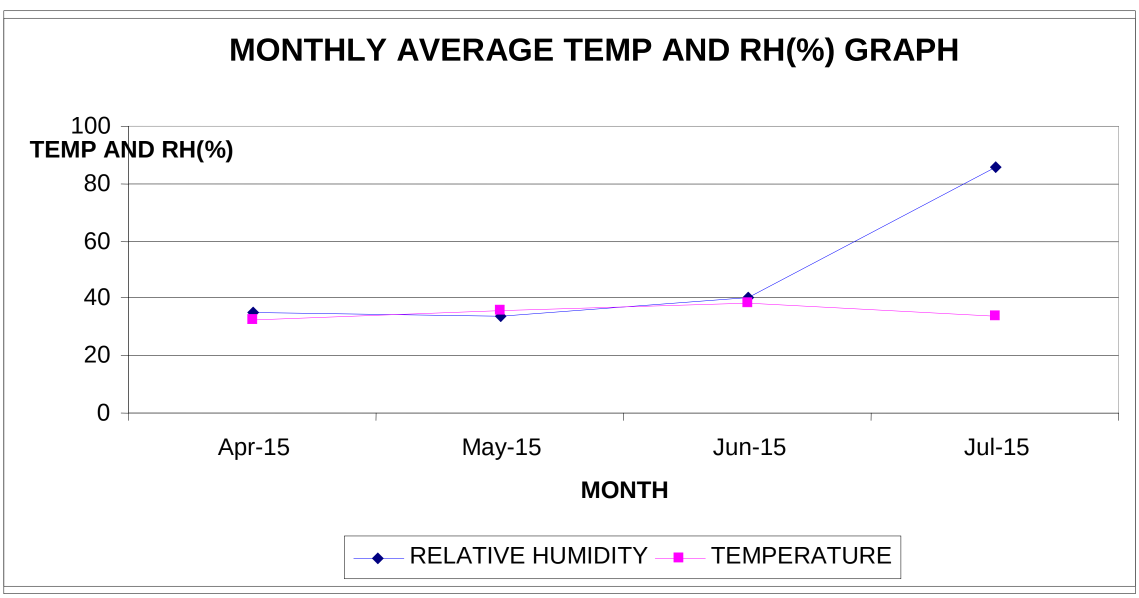

Figure-3.9

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Monthly Average Temperature (°C) and Relative Humidity (%) Bar Chart from April-2015 to July-2015.

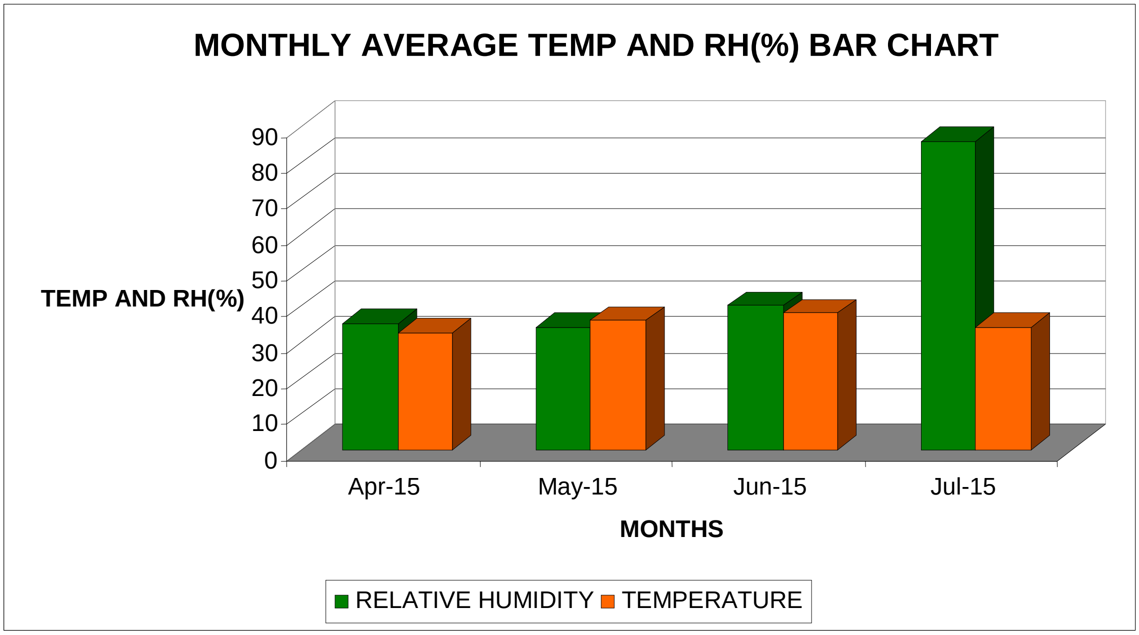

Figure-3.10

CONCLUSSION

The term "Green building" is used to describe buildings that are designed, constructed, and operated, to have a minimum impact on the environment, both indoor and outdoor. Most discussions of green buildings refer to the importance of providing an acceptable, if not exceptional indoor environment for the building occupants. However, these discussions of indoor environmental quality have not included many specific recommendations or criteria for building design, construction, or operation. Building projects described as green building demonstrations often make reference to indoor air quality, but these references are often general and qualitative. In addition, rating systems that have been developed to assess the "greenness" of a building are based largely on design features and are not particularly specific with respect to indoor air quality. This paper reviews the features of indoor air quality that are considered in green building discussions, demonstration projects, and rating systems. These green building features are discussed in terms of their completeness and specificity, and are compared to other guidance on building design, construction, and operation for good indoor air quality. A case study of indoor air quality performance in a green building is presented. This study includes a description of the indoor air quality features of the building and the results of a short-term indoor air quality evaluation of the building involving ventilation and contaminant concentration measurements.

The manner in which indoor air quality is addressed in discussions of green buildings and green building relating systems was reviewed and discussed. In reviewing green building demonstration projects, it was seen that many issues related to indoor air quality were not discussed. The issues that were discussed, to varying degrees of specificity, were building ventilation and material selection for low VOC emissions. Also, indoor air quality issues were not always fully addressed with respect to their "greenness", e.g., the trade-off between increased ventilation and energy use. This is most likely due to the inherent difficulty in making these trade-off decisions between difficult-to-quantify parameters. Issues related to indoor air quality frequently were not mentioned at all, and only the energy-related issues were addressed. Based on the reviewed rating systems and demonstration projects, it appears that demonstration projects need to be more comprehensive and specific in addressing indoor air quality issues.

Indoor air quality guidance in general, including green building rating systems, is challenged by the current limits of knowledge and the inability to be quantitative on all issues, e.g., VOC concentration limits and emission guidelines. Specifically, there are no standard methods for determining emission characteristics of materials, and there are inadequate data concerning the health effects of the compounds emitted. This problem not only exists in the emission test laboratories but is further confounded by the unlimited possibilities of material combinations, loadings, and building operating conditions that can occur within the built environment.

Indoor air quality is an important feature in almost all discussions of green buildings and is featured prominently in current green building rating systems. However, these rating systems are focused primarily on building design as opposed to actual performance. As has been seen in many studies of building performance, design goals are not always realized in practice due to short comings in building construction, operation, and maintenance. Since there is no reason to expect that green buildings will not have similar problems, performance testing is key to determining whether indoor air quality design goals have been realized in green buildings. This was revealed with respect to several indoor air quality issues addressed in the case study of the green building demonstration projects presented in this paper. TVOC measurements revealed an episode of elevated source strength significantly greater than those measured earlier the same day and the next day, indicating that even though much attention was given to the selection of building materials, unanticipated sources can still be introduced into the building. Elevated carbon dioxide levels appeared to be related to the outdoor air ventilation rates. Even though the building ventilation system was designed with ventilation rates well in excess of those recommended in ASHRAE Standard 62, the actual rates at the time of the measurements were below the design values on most of the floors. The reason for the discrepancy between the design and actual ventilation rates was not analyzed, but it is more likely to be an operational issue than a design issue. While differences between design and operation are not unusual in buildings, their existence points to the need for performance monitoring in green and other buildings.

RECOMMENDATION

The following recommendation have been made for Energy Conservation in Building and its Environmental Benefits (Green Buildings):

(1) The wind direction and velocity must be studies as per seasonal variation and building must be oriented.

(2) The Sun rise and Sun set and its impact on building radiations must be taken into consideration and accordingly. The material of the building must be selected specially for exterior and interior design of the building.

(3) The impact of rain water on the building and its surrounding must be considered for the thermal comfort of the building along with reduction in Air- Conditioning through ventilation.

(4) The vegetation cover should be design as per the eco-inventory of the building plan and accordingly the vegetation cover that is selection of trees, selection of shrubs and ground cover must be taken into consideration.

(5) The rain water harvesting for the ground water improvement with respect to quality and quantity must be considered with concept of zero rain water discharge out of the building.

Finally the relation-ship of the building with soil, water and vegetation must be considered in order to improve the environment of the building and its surrounding.

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