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ANALYSIS OF SOLAR RADIATION IN EXTERNAL WALL BY USING REMOTE SENSING & GIS

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Abstract—The principle concern of this paper is to determine the impact of solar absorption coefficient of external wall on building energy consumption. Simulations were carried out on a college building (kings college of engineering) by using the simulation using Autodesk . Results show that reducing solar absorption coefficient leads to a great reduction in building energy consumption and thus light-colour materials are suitable.

Keywords—Solar radiation, External wall, Building, kings college of engineering

I. Introduction:

The climate to which a building material is exposed has a very direct effect on its indoor temperature and humidity, which can be controlled by the wall structure . Temperature and humidity distributions vary with building and wall orientation, while solar radiation, wind and rain affect not only wall surfaces but their inner cores as well.

II. Analysis:

- The impact of solar radiation can determine by using computer application for college building block I,II,III,IV where consider for this case study but expect block I, block II are directly affected by solar radiation so major analysis carried out for those two block

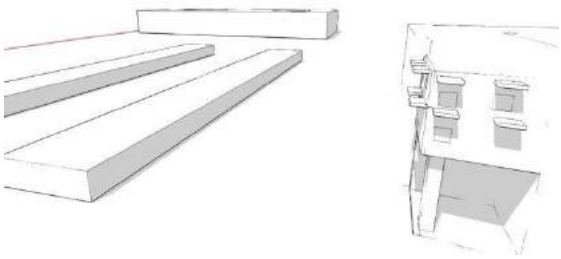

Figure (1):Fornt view of girls hostel

Expect block I,II all other block where covered with trees hence the solar radiation maximum is stopped and it all have good geometrical structures like sun shade

- But block I directly facing the west direction hence it affected by radiation in afternoon time but it majorly rectified by arches design in front side so it

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maximum minims

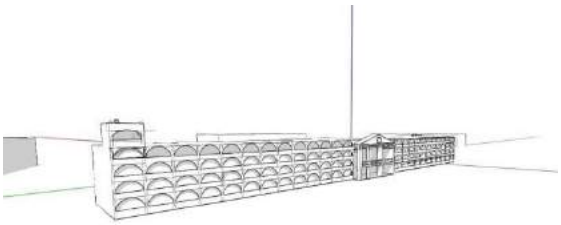


Figure (2): Fornt view if block I

- As like block II major area is directly expose to solar radiation and also absence of sun shade hence it also make the way or more sun radiation and the block II its not perfectly 90 degree it turns with an angle of nearly 20degree this factors plays a major role in analysis of solar radiation

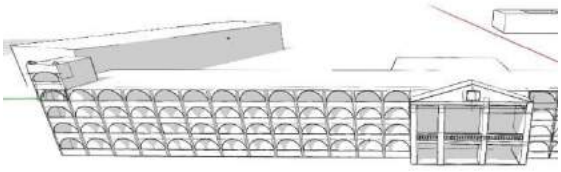


Figure (3):Block II inclined with the angle of 20^0

III. Method of analysis

- The solar radiation of exterior wall of the block which majorly affected by the radiation
- The solar radiation differed place to place to and also differs with time
- Hence analysis done at the afternoon becase it has effective solar radiation
- And analysis carried out for whole form
- Month of January to December
- The solar radiation measure in the unit Wh/sq.m

IV. Procedure :

- 3D model of the anglicised building is important for thermal analysis of building with more accuracy and angle of the building and location is highly important
- The location and perfect angle of the building is adopted for highly accurate source GOOGLE EARTH
- The 3D model is made by use GOOGLE SKETCH UP

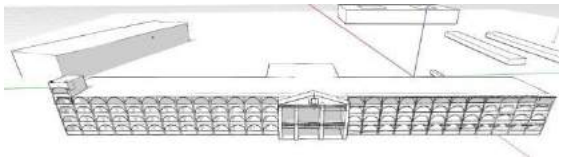
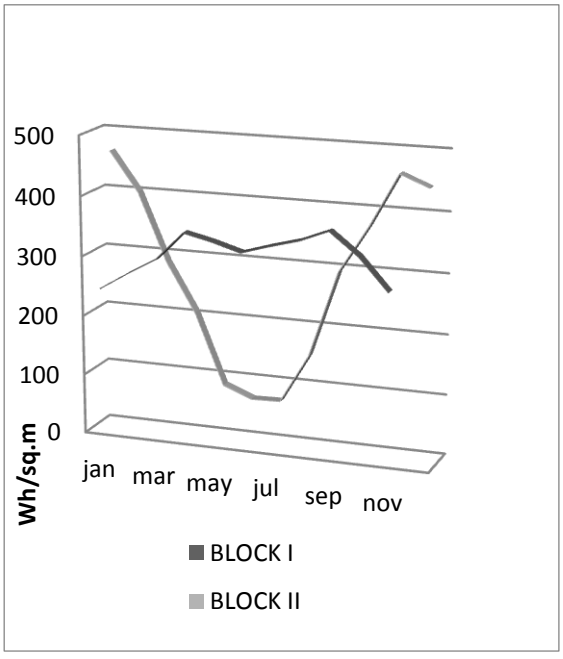


Figure (3): Building created by REVIT

- The thermal analysis done by Autodesk
- Thermal analysis done for all months for two block and the result where explain by graph the monthly comparative analysis

Results and discussion:

Table (1):Compartive Analysis of Bolck I &Block II



- In the month of June great fall in radiation about 67.34 Wh/sq.m due angle of the block II plays the huge role in it
- The block II have the inclination of 20 degree hence the fall in radiation occurs

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- Due the angle of the block II at the month June the radiation is reduced 603.3 Wh/sq.m to 67.34 Wh/sq.m
- The table is given below it shows the amount of radiation in several months

Table (2): Amount of radiation in Block I & Block II

MONTHS	Block I Wh/sq.m	Block II Wh/sq.m
Jan	244.7	465
Feb	274	399.4
Mar	301.2	286.1
Apr	349.9	205.3
May	339	86.26
Jun	352	67.34
Jul	339.6	68.76
Aug	352.7	151
Sep	372.1	294.9
Oct	334.2	371.8
Nov	281.6	460.6
Dec	262.3	441.4

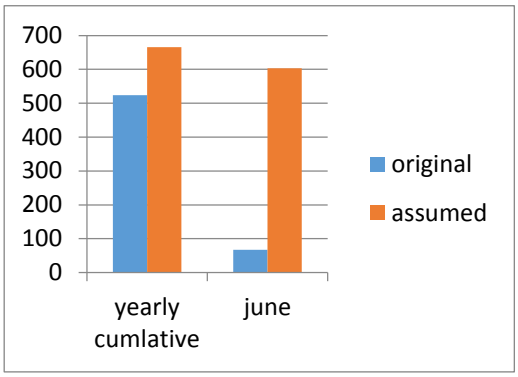
- The thermal analysis done by yearly cumulative analysis method

Table (3): Year cumulative analysis of BlockI & Block II

Year cumulative	Block I Wh/sq.m	Block II Wh/sq.m
	390.9	523.6

- The angle of the block II helps lot to reduce the solar radiation due 20 degree inclination
- The assumption is carried out If the block II does not have inclination then what will be the result and the compartion is given

Table (4):Graph for table 3



V. Heat Problem due High Temperature:

The healthy human body maintains its internal temperature around 37°C. Variations, usually of less than 1°C, occur with the time of the day, level of physical activity or emotional state. A change of body temperature of more than 1°C occurs only during illness or when environmental conditions are more than the body's ability to cope with extreme heat.

As the environment warms-up, the body tends to warm-up as well. The body's internal "thermostat" maintains a constant inner body temperature by pumping more blood to the skin and by increasing sweat production. In this way, the body increases the rate of heat loss to balance the heat burden. In a very hot environment, the rate of "heat gain" is more than the rate of "heat loss" and the body temperature begins to rise. A rise in the body temperature results in heat illnesses

When the air temperature or humidity rises above the range for comfort, problems can arise. The first effects relate to how you feel. Exposure to more heat can cause health problems and may affect performance.

As the temperature or heat burden increases, people may feel:

- Increased irritability.
- Loss of concentration and ability to do mental tasks.
- Loss of ability to do skilled tasks or heavy work.

VI. Conclusion:

The thermal analysis of building in the kings college of engineering gives the result the block II have more chance to affected by solar radiation in the college campus and less affected place is civil block because of the direct radiation is minimised by trees and girls hostel also have minimum solar radiative place in over all college campus

Temperature of block II can be reduce by providing head insulation

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