

TES ASSIGNMENT_AKSHAYA KUMAR GOPIKUMAR

TASK 1

CONSIDERING THE SAME EXAMPLE YOU SOLVED IN THE PREVIOUS ASSIGNMENT (RADIATIVE HEAT TRANSFER BETWEEN TWO PARALLEL PLATES), HOW MANY SHIELDS WITH EPSILON = 0.1 SHOULD YOU ADD IN ORDER TO HAVE THE NEW HEAT TRANSFER RATE TO BE 1% OF THE CASE WITHOUT SHIELDS ?

PREVIOUS SUM

$$\sigma = 5.67 \times 10^{-8}$$

NET HEAT TRANSFER WITHOUT SHIELDS

$$Q/A = \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1}$$

$$\frac{Q}{A} = 5.67 \times 10^{-8} \frac{(800^4 - 500^4)}{\frac{1}{0.2} + \frac{1}{0.7} - 1}$$

$$\frac{3625.4W}{M \times 2}$$

CASE 2

WHEN $\epsilon = 0.1$

$$\sigma(T_1^4 - T_2^4) / (1/\epsilon_1 + 1/\epsilon_2 - 1) + n (1/\epsilon_3 + 1/\epsilon_3 - 1) = \sigma(T_1^4 - T_2^4) / (1/\epsilon_1 + 1/\epsilon_2 - 1)$$

$$(1/\epsilon_1 + 1/\epsilon_2 - 1) + n (1/\epsilon_3 + 1/\epsilon_3 - 1) = 100 (1/\epsilon_1 + 1/\epsilon_2 - 1)$$

$$(1/0.2 + 1/0.7 - 1) + n (1/0.1 + 1/0.1 - 1) = 100(1/0.2 + 1/0.7 - 1)$$

$$5.43 + 19n = 543$$

$$19n = 543 - 5.43$$

$$19n = 537.57$$

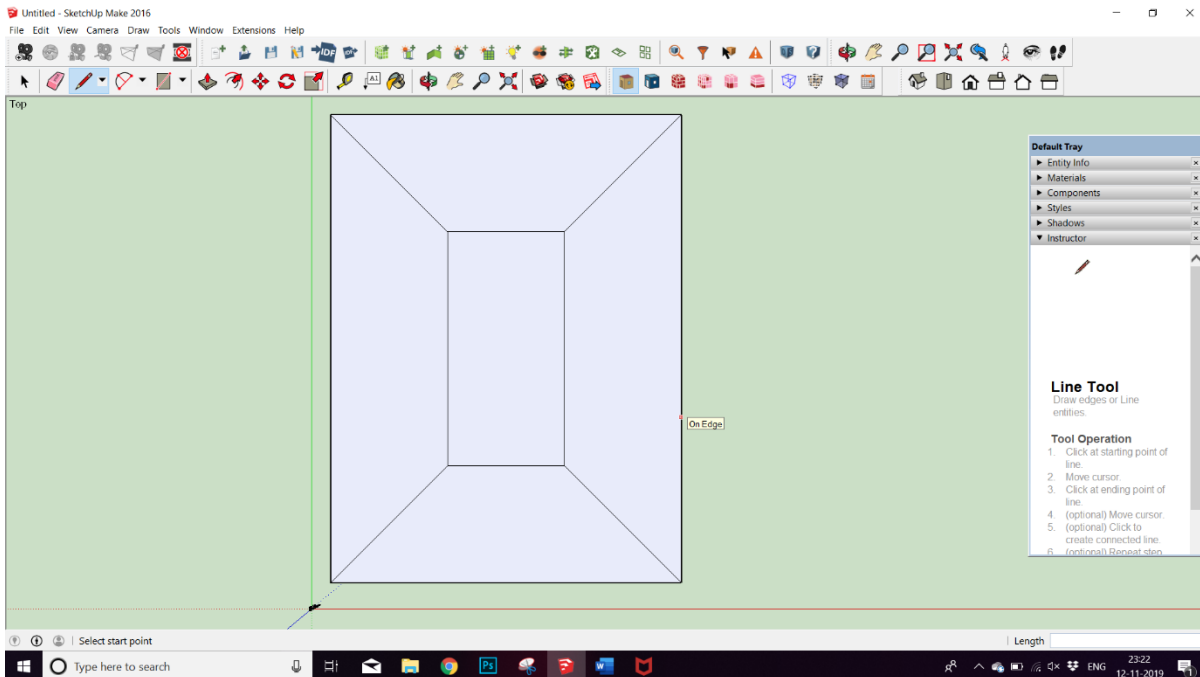
$$N = 537.57/19 = 28.29$$

$$N = 28 \text{ shield}$$

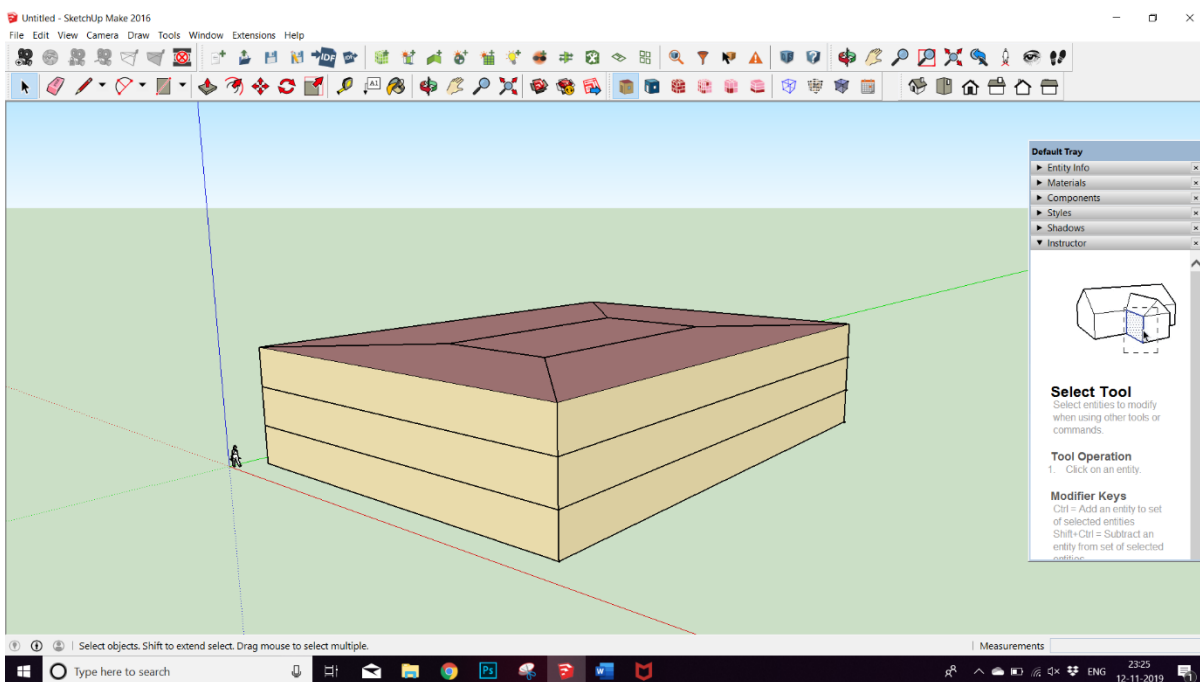
TASK 2

OPEN STUDIO- SKETCHUP PROCEDURE

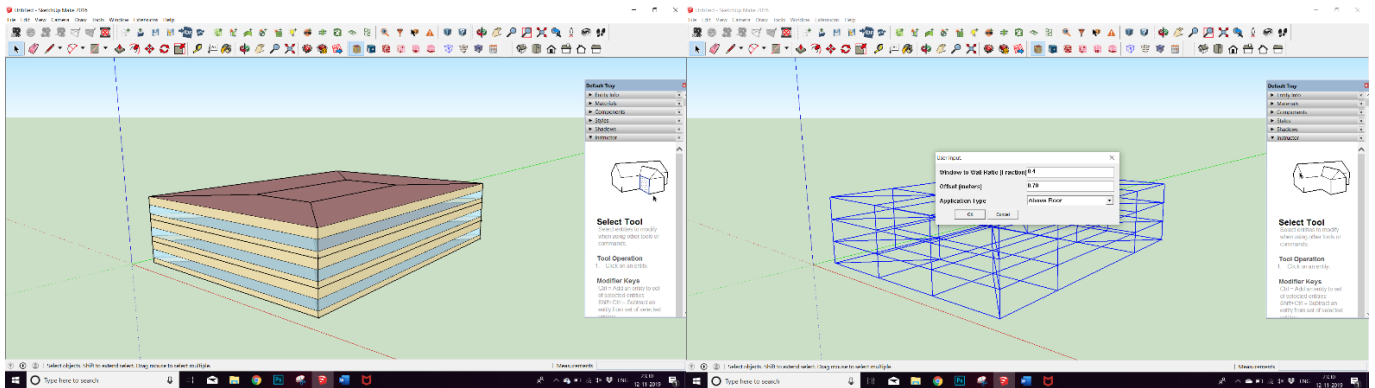
- 1) CREATE A RECTANGLE OF DIMENSIONS 30M X 40M. OFFSET 10M INSIDE THE RECTANGLE AND CONNECT THE EDGES WITH LINES.



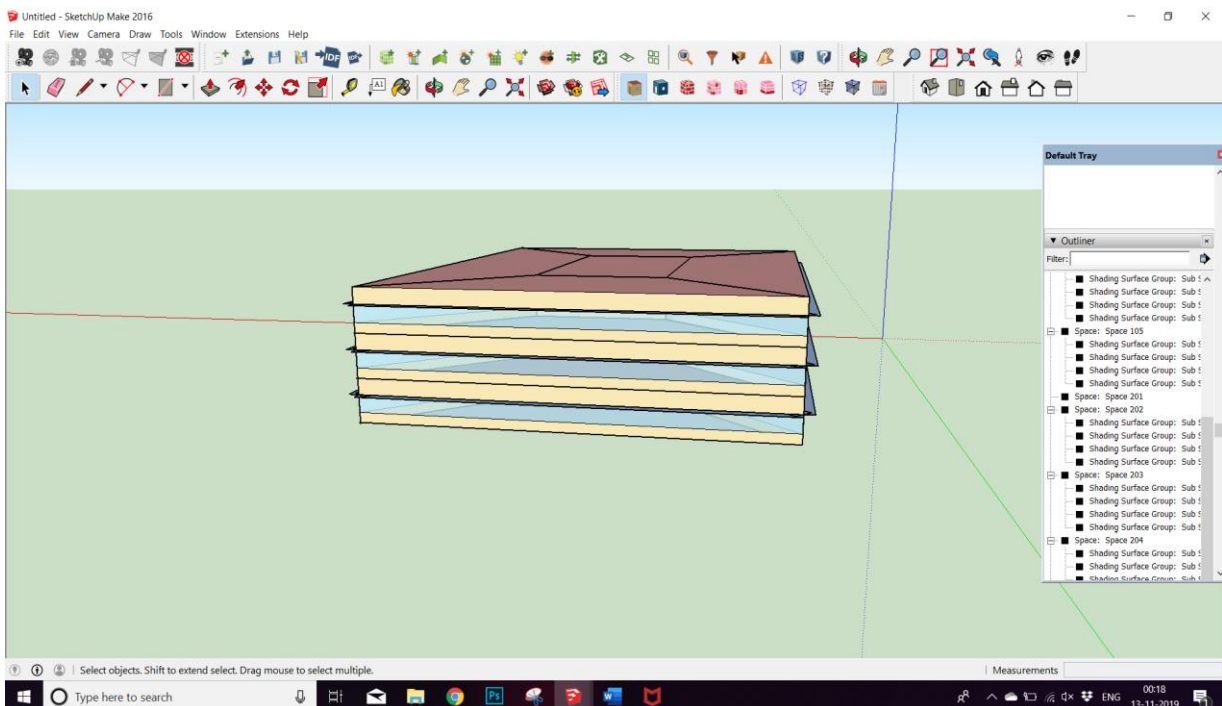
- 2) SELECT THE ENTIRE RECTANGLE AND CLICK ON CREATE SPACES ICON. CHANGE THE NO.OF FLOORS TO 3 AND HEIGHT REMAIN 10'.



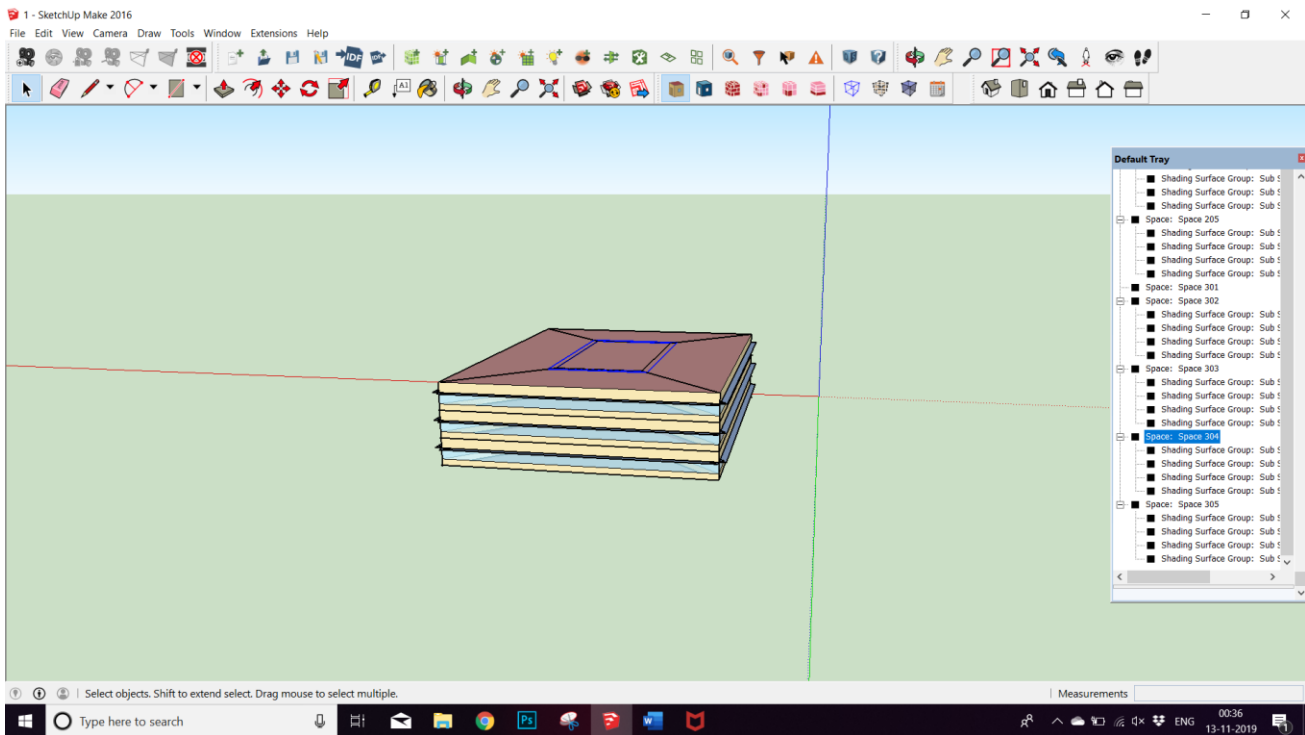
- 3) TO CREATE WINDOWS,
EXTENSIONS – OPEN STUDIO USER SCRIPTS – ALTER/ADD MODEL ELEMENTS – SET WINDOW WALL RATIO.
CHANGE OFFSET TO 0.7M.



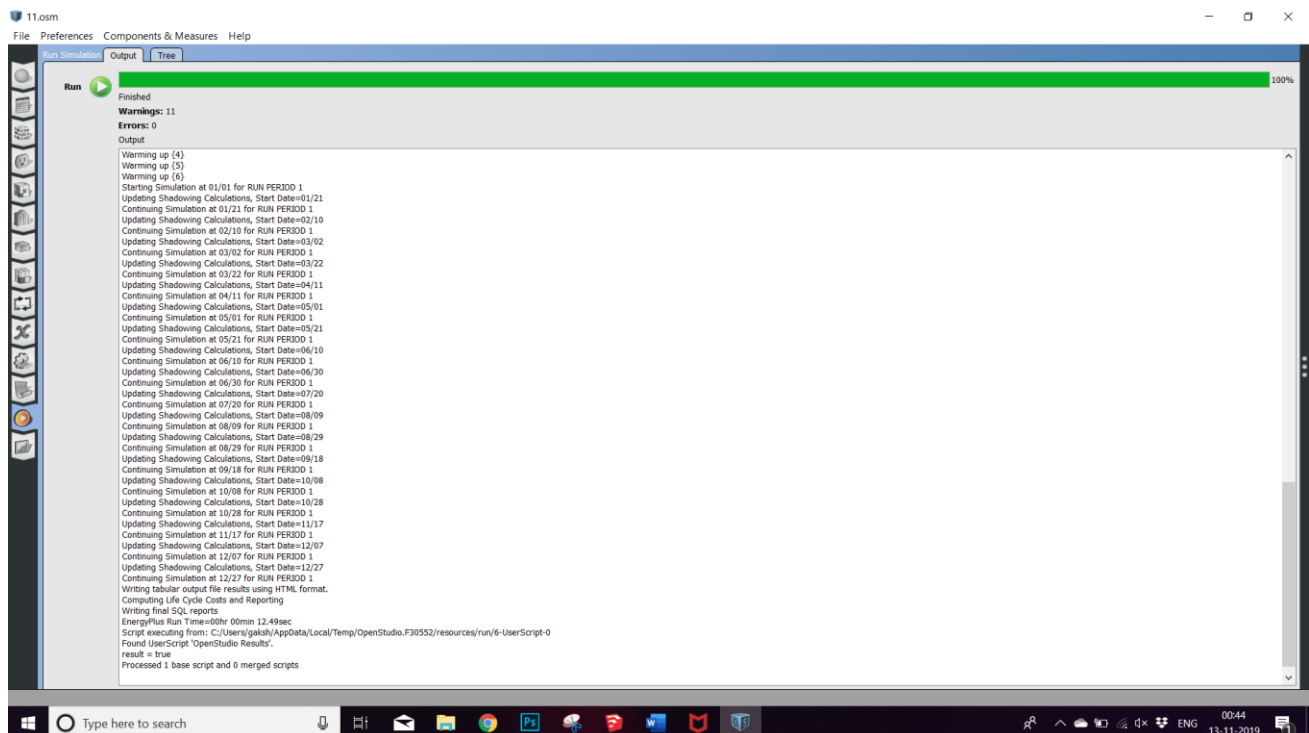
- 4) THE NEXT STEP IS TO CREATE SUNSHADE OVER THE WINDOWS. SELECT THE ENTIRE MODEL, UNSELECT THE WALL OF THE NORTH SIDE AND CLICK ON SURFACE SEARCH TOOL. CHANGE THE VALUE FROM 0 TO 90 AND SEARCH THE MODEL. ONE SIDE WILL NOT APPEAR AND SUNSHADE WILL BE PROVIDED LATTER TO RETRIEVE THE ENTIRE MODEL, SELECT THE ENTIRE MODEL AGAIN AND SELECT SURFACE SEARCH , CHANGE THE VALUE FROM 90 TO 0 AND SEARCH THE ENTIRE MODEL.



- 5) IN THE OUTLINER TOOLBOX , TO SET THE THERMAL ZONE, SELECT 101,102,103 AND 105 OF LEVEL 1 AND CLICK ON SELECT ATTRIBUTES FOR SELECTED SPACES. CHANGE THE VALUES ACCORDINGLY.REPEAT THE STEPS WITH OTHER LEVELS. THIS PROCESS IS DONE TO SET THE THERMAL ZONES OF DIFFERENT LEVELS.



- 6) OPEN OPENSTUDIO APP AND ADD THE OPENSTUDIO MODEL AND ALSO ADD THE WEATHER DATA OF PIACENZA AND RUN THE MODEL.



7) THE RESULTS DATA SUMMARY WILL APPEAR ONCE THE MODEL HAS BEEN RUN.

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Results Summary

Reports: OpenStudio Results

Open ResultsViewer for Detailed Reports

OpenStudio Results

Model Summary

Building Summary

Information	Value	Units
Building Name	Building 1	building_name
Net Site Energy	2,370,377	kBtu
Total Building Area	36,597	ft²
EUI (Based on Net Site Energy and Total Building Area)	64.77	kBtu/ft²
OpenStudio Standards Building Type		

Weather Summary

	Value
Weather File	Piacenza - ITA IGDG WMO#-160840
Latitude	44.92
Longitude	9.73
Elevation	440 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

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Results Summary

Reports: OpenStudio Results

Open ResultsViewer for Detailed Reports

Annual Overview

End Use - view table

Sizing Period Design Days

	Maximum Dry Bulb (F)	Daily Temperature Range (R)	Humidity Value	Humidity Type	Wind Speed (mph)	Wind Direction
None	32.0	0.0	0.0		0.0	0.0

Unmet Hours Summary

Time Setpoint Not Met	Time (hr)
During Heating	0.0
During Cooling	0.0
During Occupied Heating	0.0
During Occupied Cooling	0.0

Unmet Hours Tolerance

Tolerance for Time Setpoint Not Met	Temperature (F)
Heating	0.36
Cooling	0.36

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