The Fourth Syrian Mathematical Modeling Challenge [SMMC-2023]

2023 Syrian Mathematical Modeling Challenge Competition starts 13 April 2023 at 10 am and ends 15 April 2023 at 10 am

Introduction

Recently, due to the power outages for long periods in Syria, many people have resorted to installing solar panels. The installation of these solar panels on the roofs of buildings that are not well prepared, posed many challenges and practical problems, in addition to disputes between neighbors about the eligibility and priority of solar panels installation. In fact, there are many obstacles and installing limitations as the orientation, shade, or the dimensions of their Building roof. There are many factors that make a roof more or less suitable for solar panels. Sometimes the conditions of the building roof affect some difficulties in installation of solar system panels.

To get the best performance of the solar panels, you need to point them in the direction and angle that captures the most sun. But there are a number of variables in figuring out the best direction.

Solar panels should always face true south if you are in the northern hemisphere, or true north if you are in the southern hemisphere. From other side the angle of solar panel is very important in order to collect solar power efficiently, the best angle for your solar panels is the one that allows the panels to get the most direct, perpendicular light.

The problem

Some problems appear between the residents of the building about installing the panels, for example: who has the right of installation, and how much space for each apartment?

To apply justice between the residents of the same building, it is necessary to know what is the average energy consumption per house? and to distribute the roof area fairly to everyone in considering that they do not shade others panels, by preserving the right of any resident to install his own solar system later. and always by considering that the building surface sufficient to install the panels with the ideal angles of inclination?

Suppose we have a building consisting of four floors and each floor contains four apartments in the city of Homs, the dimensions of the building are 20x20 [m] oriented towards the south.

Consider that the capacity of each solar panel 550 [watts] and dimensions of 105x210 [cm].

Your task

Your form must meet the following:

The largest capacity that can be obtained from this surface and Is it possible to achieve an acceptable capacity for all residents and achieve self-sufficiency in electrical energy for winter & summer. following these cases:

- Installation possibilities are as follow:

    a. All panels in the same plan.
    b. Panels are installed one by one longitudinally.
    c. Panels are installed one by one Laterally.
    d. Two panel in height fixed longitudinally.

Your submission must be send as PDF which includes the following:

- One-page summery sheet
- One-page table of contents
- Your solution of no more 20 pages for a maximum of 22 pages including the summary sheet and the table of contents
- References and appendices are not included in the preceding count.

Each team must send one submission to the following e-mail before the deadline.

Olympiadsyrian@gmail.com

Submission must be typed in Times New Roman font, 12-point size, on A4 paper size. Each team is composed of up-to four members.

Good Luck

Dr. Eng Eyad Dabboura

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