

VAN LANG UNIVERSITY
FACULTY: ARCHITECTURE

ANSWER KEYS FOR THE END-OF-COURSE EXAMINATION
Semester 2 , Year 2022 - 2023

Course code: 222_7AR0220_01
Course name: Architectural physics 1
Group code: K26DB-A01 K26DB-AR
Duration (minute/day): 60 minutes
Format: Essay

Format nội dung đáp án đề thi:

- Font: Times New Roman
- Size: 13

A1 (5 points): Based on the given solar apparent chart, indicate the parameters: solar altitude angle h , azimuth angle A at 2:00 p.m. on April 21. Application of solar apparent diagram in architectural design

h : 60°

A : 80°

The solar apparent diagram, also known as the sun path diagram or sun chart, is a graphical representation of the sun's position in the sky at different times of the day and year. It is a valuable tool in architectural design as it provides important information about solar access, shading, and daylighting. Here are some applications of the solar apparent diagram in architectural design:

Solar orientation: The solar apparent diagram helps architects determine the optimal orientation of a building in relation to the path of the sun. By analyzing the diagram, architects can identify the sun's position throughout the year and orient the building to maximize solar exposure for passive solar heating, natural lighting, or solar panel installations.

Shading analysis: The solar apparent diagram allows architects to assess the potential for solar shading on a building. By understanding the sun's path and the shadow patterns created by nearby objects or buildings, architects can design shading devices, such as overhangs or louvers, to minimize unwanted solar heat gain or glare while still allowing for desirable daylighting.

Daylighting design: The solar apparent diagram helps architects determine how natural light will enter a space at different times of the day and year. By analyzing the diagram, architects can identify areas that may receive direct sunlight, diffuse skylight, or deep shadows. This information can guide the design of windows, skylights, and light shelves to

optimize daylighting, reduce the need for artificial lighting, and create visually comfortable and energy-efficient spaces.

Passive solar design: The solar apparent diagram is a crucial tool for architects designing passive solar buildings. It provides information about the sun's path, which helps in determining the size and placement of windows, thermal mass, and insulation. By strategically designing a building to maximize solar gain in winter and minimize it in summer, architects can create comfortable indoor environments with reduced energy consumption for heating and cooling.

Solar energy systems: Architects can utilize the solar apparent diagram to assess the feasibility and performance of solar energy systems, such as photovoltaic panels or solar water heaters. By understanding the sun's path and the potential for shading, architects can determine the optimal location and tilt angle for solar panels, ensuring maximum solar energy capture and system efficiency.

In summary, the solar apparent diagram is an essential tool in architectural design, providing valuable information about solar access, shading, and daylighting. By utilizing this diagram, architects can optimize building orientation, design effective shading strategies, enhance daylighting, and incorporate renewable energy systems, ultimately creating sustainable and energy-efficient buildings.

A2: (5 points) Cross Ventilation: Arrange windows or openings on opposite sides of the space to create a flow of air. This allows fresh air to enter from one side while stale air exits from the other, promoting circulation.

Window Placement: Position windows strategically to take advantage of prevailing winds. This helps to channel air effectively through the space. Windows should be placed high on one side for fresh air intake and low on the opposite side for exhaust.

Ventilation Openings: Use adjustable vents, louvers, or openings that can be easily controlled to regulate the airflow. This allows for adjustments based on weather conditions and desired ventilation levels.

Atriums or Courtyards: Incorporate open spaces or internal courtyards within buildings to create natural airflow channels. These can act as central areas for air circulation within the building.

Roof Ventilation: Install roof vents or skylights to allow hot air to rise and escape, creating a stack effect that draws in fresh air from lower openings.

Natural Ventilation Design: Consider the architectural design of the space to promote natural ventilation. This may include features like high ceilings, open floor plans, and the use of building materials that facilitate airflow.

Shade and Solar Control: Use external shading devices such as awnings or louvers to prevent excessive heat gain from direct sunlight. This helps maintain a comfortable indoor environment while allowing for natural ventilation.

Proper Maintenance: Regularly clean and maintain windows, vents, and openings to ensure unobstructed airflow. Remove any debris or obstructions that may hinder the natural ventilation process.

Ngày biên soạn: 8/05/2024

Giảng viên biên soạn đáp án đề thi: Th.S KTS Nguyễn Thị Việt Hà

Ngày kiểm duyệt:

Trưởng (Phó) Khoa/Bộ môn kiểm duyệt đề thi: Th.S KTS Nguyễn Bảo Tuấn