TRƯỜNG ĐẠI HỌC VĂN LANG
**GHI TÊN ĐƠN VỊ CHỦ QUẢN MÔN HỌC**

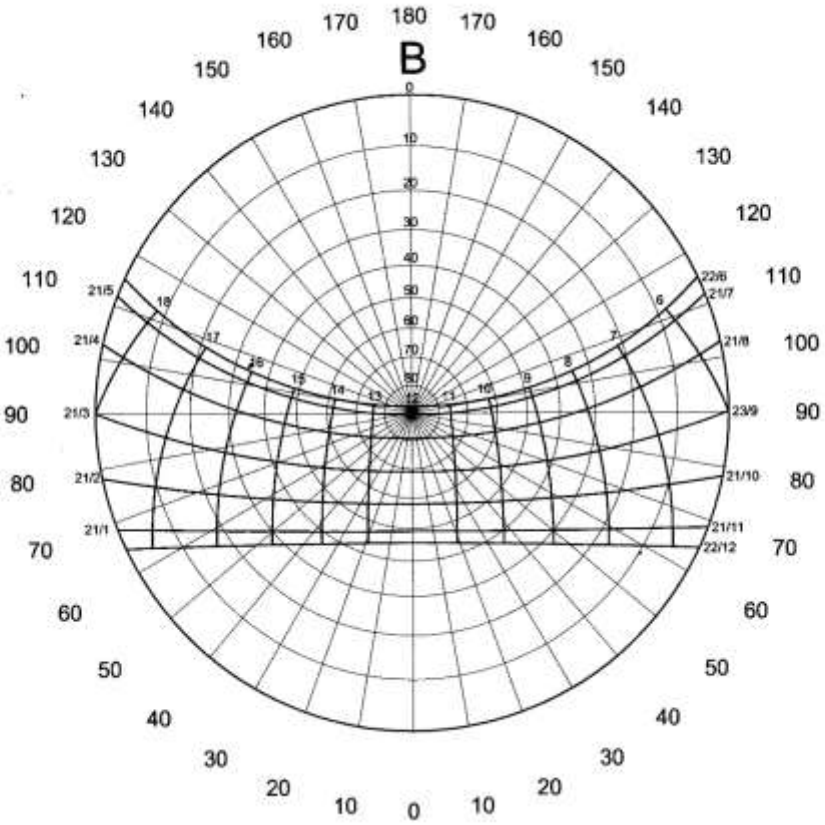
**ĐỀ THI, ĐÁP ÁN/RUBRIC VÀ THANG ĐIỂM**
**THI KẾT THÚC HỌC PHẦN**
**Học kỳ 2, năm học 2024-2025**

## I. Thông tin chung

| | | | |
|---|---|---|---|
| Tên học phần: | ARCHITECTURAL PHYSICS 01 | | |
| Mã học phần: | 242_72ARPH40423_01 | Số tín chỉ: | 03 |
| Mã nhóm lớp học phần: | 72K28KTRU01 | | |
| Hình thức thi: **Tự luận** | | Thời gian làm bài: **60** | phút |
| ☐ Đề thi có sử dụng phần mềm riêng | GV ghi cụ thể tên phần mềm: ……<br>…… | | |
| ***Thí sinh được tham khảo tài liệu:*** | ☐ Có | ☒ Không | |

## III. Nội dung câu hỏi thi

**Câu hỏi 1/ Question 01 (03 điểm): Based on the sun-path diagram below, calculate the 40m-tall building shadow according to the sun attitude angle 'h', from 11.00am to 13.00pm on 23$^{nd}$ of September.**



**Câu hỏi 2/ Question 02 (03 điểm): Using the Id chart, find the remaining values (of the 05 basic values: I, d, t°C, φ and Ph) based on the given values below:**

- **I = 21 (Kcal/kg), d = 17 (g/kg)**
- **φ = 80%, t°C = 35°C**
- **t°C = 27°C, I = 14 (Kcal/kg)**

**Câu hỏi 3/ Question 03 (04 điểm):**

- **How many types of sun-shading system for building façade are there based on shape and form?**
- **How does the orientation of the sun affect the choice of sun-shading system?**
- **Given the plan below and the sun-path diagram on 21st of June (Summer solstice) in Ho Chi Minh City, what is the most suitable sunshade type for a house with a front facing Northwest - 290° NW, knowing that the height of the neighboring houses is equivalent to the height of the surveyed building? Explain your answer?**

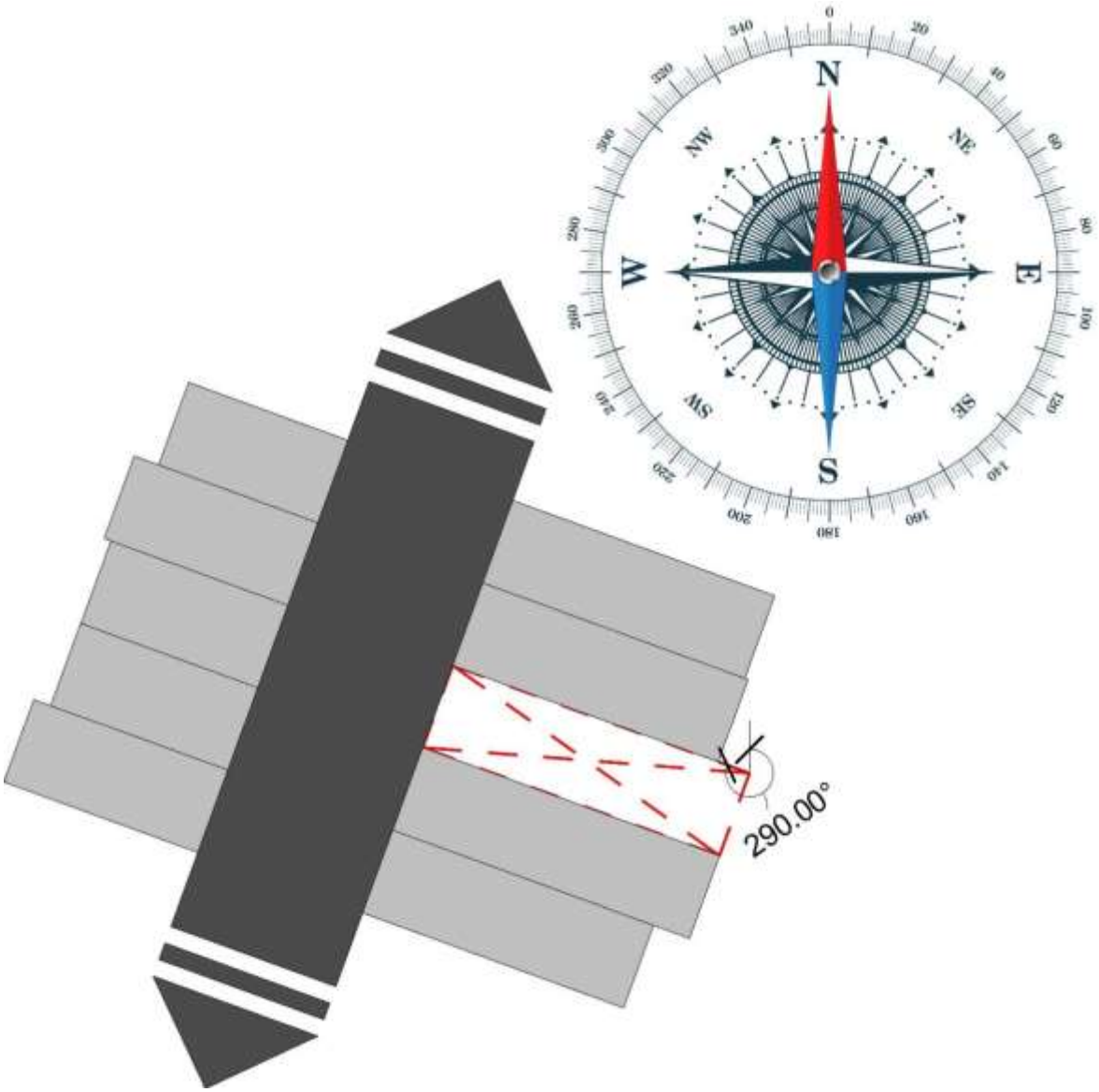



**Figure 01**

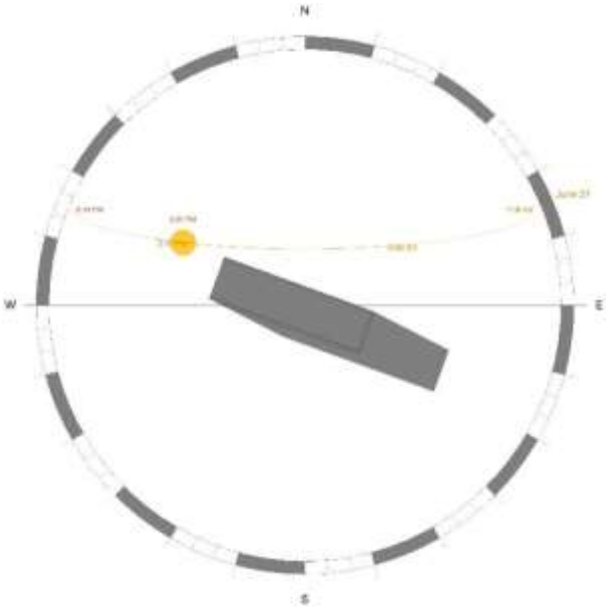


Figure 02

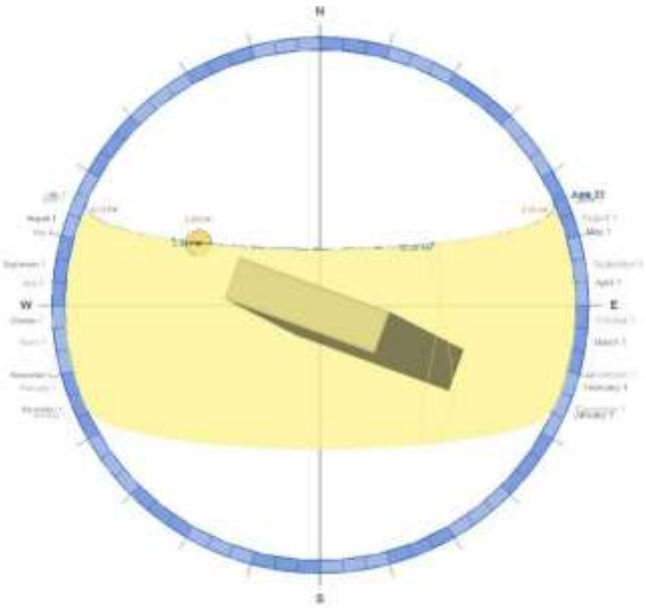


Figure 03

## ĐÁP ÁP VÀ THANG ĐIỂM

| Phần câu hỏi | Nội dung đáp án | Thang điểm | Ghi chú |
|---|---|---|---|
| **I. Tự luận** | | | |
| **Câu 1/ Question 1** | | **3.0** | |
| Length of building shadow at 09.00 am | Attitude angle 'h' = 42°<br>=> **L = 40/tan (42°) = 40/0.9 = 44.40 (m)** | 1.0 | |
| Length of building shadow at 10.00 am | Attitude angle 'h' = 54°<br>=> **L = 40/tan (54°) = 40/1.376 = 29.07 (m)** | 1.0 | |
| Length of building shadow at 11.00 am | Attitude angle 'h' = 73°<br>=> **L = 40/tan (73°) = 40/3.27 = 12.23 (m)** | 1.0 | |
| **Câu 2/ Question 2** | | **3.0** | |
| Scenario 1 | I = 21 (Kcal/kg), d = 17 (g/kg)<br>=> **t°C= 44.5 °C**<br>**φ = 28 %**<br>**Ph = 19 mmHg** | 1.0 | **0.3 for each right answer** |
| Scenario 2 | φ = 80%, t°C = 35°C<br>=> **I = 25.5 Lcal/kg**<br>**d = 28 g/kg**<br>**Ph = 31.5 mmHg** | 1.0 | **0.3 for each right answer** |

| | | | |
|---|---|---|---|
| Scenario 3 | t°C = 27°C, I = 14 (Kcal/kg)<br>=> **d = 12.2 g/kg**<br>**φ = 55 %**<br>**Ph = 14 mmHg** | 1.0 | **0.3 for each right answer** |
| **Câu 3/ Question 3** | | **4.0** | |
| Based on shape and form, how many types of sun-shading system for building façade are there? | **04 types of sun-shading system:**<br>**1. Vertical shading system**<br>**2. Horizontal shading system**<br>**3. Mixed system (combine vertical and horizontal)**<br>**4. Kinetic system** | 1.0 | **0.25 for each right answer** |
| How does the orientation of the sun affect the choice of sun-shading system? | **The orientation of the sun impacts the choice of sun-shading systems by influencing factors such as:**<br>***1. solar angle (for whole year or at specific time of the year),***<br>***2. direction of sunlight,***<br>***3. heat gain,***<br>***4. Climate and weather conditions,***<br>***5. Daylighting and energy requirements***<br>**Designing sun-shading systems according to the specific orientation of the sun helps in enhancing thermal comfort, energy efficiency, and overall building performance.** | 1.0 | **0.20 for each right answer** |
| 1. Given the plan below and the sun-path diagram on 21st of June (Summer solstice) in Ho Chi Minh City, what is the most suitable sunshade type for a house with a front facing Northwest - 290° NW, knowing that the height of the neighboring houses is equivalent to | **1. Based on the given data, it can be observed that the sun chart represents the solar position on the summer solstice, June 21st. During this time, the sun is at its highest point to the north (Northern hemisphere), causing intense sunlight to penetrate deeply into the house in the afternoon (from 3:00 pm). Therefore, choosing the solution of installing vertical sun-shading systems tilted at a 45-degree angle to the shorter side of the structure will effectively block the high-intensity sunlight from entering the house.** | 1.0 | **1.0 for choosing the right type of shading system (vertical and tilted at a 45-degree angle to the shorter side of the house)** |

| | | | |
|---|---|---|---|
| the height of the surveyed building? | | | |
| 2.Explain your answer? | **2. The reason for this choice of vertical shading is that the solar elevation angle 'h' of the sun at this time is relatively low, and the sun's direction of incidence is quite direct towards the front of the house. Therefore, the solution of using vertical sun-shading systems proves to be the most effective in reducing sunlight exposure.** | 1.0 | **1.0 for the explanation from the student** |
| | **Điểm tổng** | **10.0** | |

*TP. Hồ Chí Minh, ngày 20 tháng 03. năm 2025*

**Người duyệt đề**

**Giảng viên ra đề**

**ThS.KTS. TRỊNH MẠNH QUYỀN**