

VAN LANG UNIVERSITY  
FACULTY: ARCHITECTURE

**ANSWER KEYS FOR THE END-OF-COURSE EXAMINATION (2ND)**  
**Semester 2 , Year 2022 - 2023**

Course code: 233\_72ARPH40433\_01

Course name: Architectural physics 1

Group code: 72K27KTRU01

Duration (minute/day): 60 minutes

Format: Essay

**How to submit (Lecturer gives clear requirements):**

**Suggestions:**

- Students type directly in the submission box on the system:
- Students upload images (including charts, diagrams, and special formulas, **NOT** the lecture slides and word files)
- Students are permitted to use documents.

**A1:** (5 points).

Here are the important factors in artificial lighting design and some technical specifications of the lamp:

- Lighting Intensity (lux)

Measured in lux (lumens per square meter)

Appropriate illuminance levels are crucial for visual comfort and task performance

Required lux levels depend on the room's function (e.g. living room, bedroom, kitchen)

Uniform illuminance distribution is important

- Color Temperature (Correlated Color Temperature - CCT):

Measured in Kelvin (K)

Describes the apparent warmth or coolness of the light

Warmer CCT (2700K-3000K) creates a cozy, intimate atmosphere

Cooler CCT (4000K-6500K) provides brighter, more energizing lighting

CCT should match the intended use of the space

- Color Rendering Index (CRI):

Measures how accurately a light source renders colors compared to natural daylight

High CRI ( $R_a \geq 80$ ) ensures natural and accurate color perception

Important for tasks requiring precise color identification

- Luminous Efficacy:

Ratio of a light source's light output (lumens) to its power consumption (watts)

Higher efficacy means more energy-efficient lighting

An important factor in selecting energy-saving lighting solutions

- Lifespan:

Expected lifetime of a light source is crucial for maintenance planning

LED lights typically have longer lifespans compared to traditional light sources

- Glare Control:

Glare can cause eye strain and visual discomfort.

Proper placement, shielding, and use of diffusers can help control glare.

Considering these technical specifications, along with the room's function and design, will help create an effective and comfortable artificial lighting system.

**A2:** (5 points)

Reverberation time is a criterion for evaluating sound quality in an auditorium, and is the basis for deciding the shape and size of the auditorium. Depending on the function of the auditorium, there is a required reverberation time. When calculating, the reverberation time should be longer than required so that when put into use, a change in the sound absorption coefficient will make the reverberation time more reasonable.

Rooms with different functions will have different reverberation time requirements.

Determine the reverberation time as the time required for the sound pressure level of a certain frequency at a standard steady state of 60dB to decrease until it is no longer audible (0dB). In rooms with the same amount of sound absorption  $A = S \cdot \bar{\alpha}$ , the room with the larger volume has the longer reverberation time, the reason is that the large volume room has a long reflected sound path, the number of reflections in a single unit. The less time it takes, the longer the sound energy fades, the longer the reverberation time. Therefore, the reverberation time is the basis for determining the dimensions of the surfaces in the auditorium.

*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