

Electrical Installation, Planning & Estimating

Subject Code: 26741

Course Teacher: S. M. Mayeen Hasan (Instructor)

Illumination & Lighting Scheme

- The laws of illumination
- Types of lighting
- The factors to be considered for designing a lighting scheme



The laws of illumination:

- Illumination: Illumination is defined as the energy (E) of light striking a surface of specific unit area per unit of time.
- The expression is given as:

$$E = I \cos a / d^2$$

where, E= illumination in lumens (L/mm²)

I= source intensity in candlepower

a= angle between the source light rays and a unit vector normal to the illuminated surface

d= distance from the source to the illuminated surface in mm



The laws of illumination (contd.)

1. Proportional law:

$$E \propto I$$

2. Inverse square law:

$$E \propto 1/d^2$$

3. Lambert's cosine law:

$$E \propto \cos a$$

Where, E = illumination in lumens (L/mm^2)
 I = source intensity in candlepower
 a = angle between the source light rays and a unit vector normal to the illuminated surface
 d = distance from the source to the illuminated surface in mm

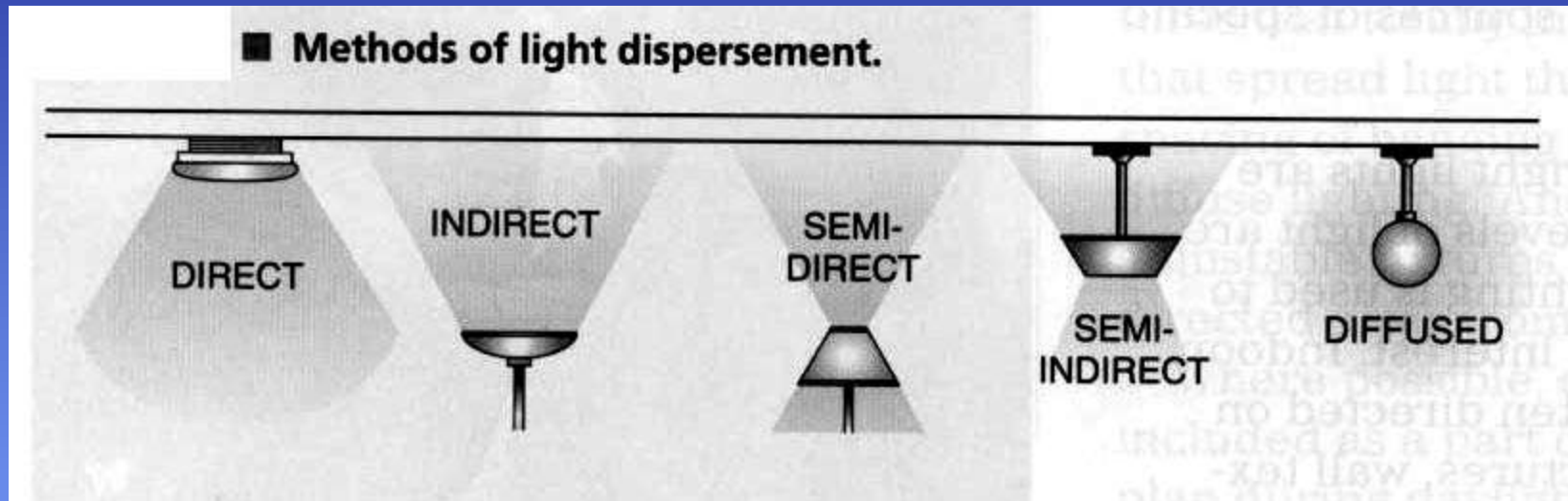


Types of lighting

- ① Direct lighting
- ① Indirect lighting
- ① Semi-direct lighting
- ① Semi-indirect lighting
- ① Diffused lighting



Types of lighting (Contd.)

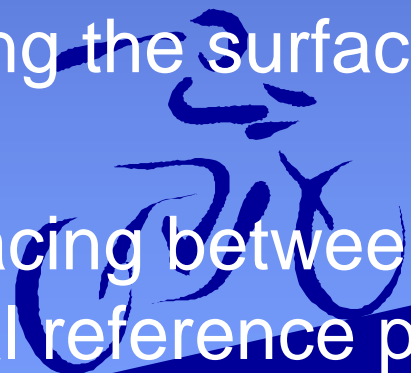


The factors to be considered for designing a lighting scheme:

- Illumination level
- Uniformity of illumination
- Colour of light
- Shadow
- Mounting height
- Spacing of luminaries
- Colours of surrounding walls



The factors to be considered for designing a lighting scheme (Contd.)

- **Utilization factor:** Lumens received on the working plane/lumens emitted by the lamp
 - **Depreciation factor:** Illumination under normal working conditions/illumination when everything is clean
 - **Waste light factor:** Wastage due to overlapping of lightwaves
 - **Reflection factor:** Luminous flux leaving the surface/luminous flux incident on it
 - **Spacing to Mounting height ratio:** Spacing between luminaries/height above the horizontal reference plane
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Thanks for your patience.

