

ELEC-E8700 - Principles and Fundamentals of Lighting

Instructions:

- All items must be answered.
- Each question is 6 points. Max. 30p.
- Please deliver the question and the answer sheet to invigilator

1. Shortly define and describe:

- a. Photon flux density
- b. Luminance
- c. Light
- d. Luminous intensity
- e. Electrical efficiency of a light source
- f. Visual acuity

2. Describe Photopic Vision

3. List and describe the objectives and recommended aspects to be considered in the lighting design of an indoor workspace (e.g. meeting room).

4. True/False

- a. Eye detects movement through peripheral vision, which is very sensitive to changes in contrast
- b. The colorless appearance of objects under moonlight or starlight is an example of photopic vision
- c. Cone cells are the light receptors that operate when eye is adapted to very low levels of light
- d. There is concentration of cone cells on the fovea (center of retina) and these are used for seeing in detail
- e. The concentration of rod cells at the edges of the retina causes the eyes to be sensitive to movement at the boundary of field of view
- f. Visual perception is related to the processing and interpretation of the information contained in visible radiation
- g. The perceived color depends on the response of different type of rods
- h. The equivalent radiometric quantity for luminous flux is irradiance
- i. The tri-stimulus share values of the primary colors are denoted with X for green, Z for red and Y for Blue
- j. For assessing the color rendering properties, a set of 7 Munsell colors which cover the color circle were selected by the CIE
- k. The spontaneous emission of light when an external potential is applied across PN-junction of LEDs is known as candoluminescence effect.
- l. LED binning allows consistent optical design and performance of LED luminaires

5. Symmetrical 100mmx100mm OLED panel. Perfectly diffusive surface with max. luminous intensity of 80cd. Power consumption 7W. Horizontally above floor.
- Luminance of the OLED panel
 - Luminous efficacy of the OLED panel
 - Illuminance at point A on the center of the "table"
 - Reflectance on a vertical diffusing wall at point B. The luminance on point B is 3 cd/m²

