

Illumination Engineering (Elective I)

(EE705/1)

Time: 3 hours

Full Marks: 70

Answer SIX questions.

TWO marks are reserved for neatness in each half.

FIRST HALF

Answer any THREE questions

1. Draw a neat diagram of human eye and label its major parts. Describe the functions of these parts. (11)
2. (a) What do you mean by perfect diffuser? Derive the relationship between total flux output and intensity of a flat diffuser.
(b) Prepare a brief write-up on the materials used for luminaires. ((1+5)+5)
3. (a) Explain the additive law and subtractive law of colour theory and suitability of their applications.
(b) Describe Munsell Colour system and explain how a colour is specified in this system. (4+7)
4. (a) What are the methods of representing intensity distribution of a lamp? With necessary diagram explain how the light intensity distribution are determined with the help of a distribution photometer.
(b) Discuss on interference of light and its applications. ((2+5)+4)
5. (a) Describe the following terms in connection with roadway lighting
(i) longitudinal reference line (ii) house side (iii) maximum cone and (iv) cut-off luminaires.
(b) Explain the design steps of Lumen method for street lighting. (4+7)

SECOND HALF

Answer Question no. 6 and any TWO from the rest.

6. (a) What is the basic difference between an ordinary fluorescent lamp and a mercury vapour lamp, both having the same constituents within the glass bulb?
(b) A halogen lamp is a better version of the incandescent lamp. Explain.
(c) Justify the choice of lighting in
i) Khidderpore Dock ii) Victoria Memorial iii) Eden Gardens (2+3+2 × 3)

7. (a) Derive the expression for luminous efficiency from the concept of spectral radiant flux distribution and the sensitivity of vision of the standard observer.
- (b) What do you mean by a lighting system? Describe its components and their significance. (6+5)
8. (a) What do you mean by polar curves and its significance to lighting design?
- (b) What is the difference between depreciation factor and utilization factor? What is generally the value of depreciation factor?
- (c) A lamp having an uniform C.P of 200 in all directions is provided with a reflector which directs 60% of the total light uniformly on a circular area of 10M diameter. The lamp is hung 7M above the area. Calculate the illumination at the center and edge of the with and without the reflector. (3+2+6)
9. (a) What is the necessity of an electronic choke for a fluorescent lamp? Explain the various parts of such a choke.
- (b) An illumination of 25 lux is to be produced on the floor of a room $12m \times 9m$. 18 lamps are required to produce this illumination in the room, if 50% of the emitted light falls on the floor. What is the power of the lamp in candela? Assume maintenance factor as unity. (7+4)
10. Write short notes on the following (Any TWO): (5½ × 2)
- (a) The construction of the LED lamp
- (b) The construction of the Sodium Vapour Lamp
- (c) The principle of operation of HID lamps.