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. (a) Derive the expression for illuminance at a point below a tubular source within the length of tube light and away from the vertical plane through the axis of the lamp.

   (b) Prepare a brief write up on different materials used for luminaires.   (5+6)

2. (a) Derive the expression for total flux output from a spherical diffuser.

   (b) Explain zonal factor. How is it used in lighting design? Explain interference of light and the theory of thin film filter.   (5+(1+1+4)

3. (a) Prepare a brief write up on CIE system of colour specification.

   (b) Differentiate between Scotopic, Mesopic and Photopic vision.   (7+4)

4. (a) Explain with necessary diagram how the light output from a lamp source is measured using integrating sphere.

   (b) Describe the following parts of human eye and their functions:
   (i) Refractory media and (ii) Tear Gland   (7+4)

5. (a) Describe four subconscious processes involved in determining the driver's actual reaction time.

   (b) Explain the design steps for building floodlighting.   (4+7)

SECOND HALF

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

6. (a) What is DALI in modern tends in lighting technology?

   (b) What is light transportation and how is it done?

   (c) What is the difference between efficiency and efficacy in lighting systems?

   (d) Name two lamps without filament

   (e) What is high mast lighting and where is it used?   (2+2+2+2+3)

7. (a) Draw the functional block diagram of an electronic choke and explain how its performance is better than the electromagnetic one? Explain also the functions of a choke.

   (b) The metal halide is a better adaptation of the mercury vapour lamp. Justify. (7+4)

8. (a) Draw the wiring diagram of a fluorescent lamp and explain in brief its operation indicating clearly the process of energy conversion.

   (b) A football pitch $120M \times 60M$ is to be illuminated for night play by similar banks of equal 1000W lamps supported on twelve towers which are distributed around the ground to provide uniform illumination. Assume that 40% of the total light emitted reaches the playing pitch and that illumination of 1000lux is necessary for television viewing, calculate the no. of lamps for each tower. The overall efficiency of the lamp is 30lm/w. (5+6)

9. (a) What are the different parts of a lighting system? In which part would you emphasise the reduction in energy consumption?

   (b) Two lampposts are 14M apart and are fitted with 200C.P lamp each at a height of 5M above the ground.
   Calculate (i)Illumination mid-way between them and (ii)Illumination under each lamp. ((2+2)+7)

10. Write short notes on the following (Any TWO): $(5\frac{1}{2} \times 2)$

    (a) The sodium-vapour lamp is the most energy-efficient

    (b) The construction of the LED lamp.

    (c) The laws of illumination