Register No.: ……………………………… Name: ………………………………………………………………..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (R), DECEMBER 2023
ELECTRICAL AND ELECTRONICS ENGINEERING
(2020 SCHEME)

Course Code :   **20EET461**

Course Name: **Illumination Technology**

Max. Marks :   **100**   **Duration: 3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. Describe any three advantages of incorporating daylight into interior lighting design.
2. Differentiate between the terms Colour Rendering Index (CRI) and Correlated Colour Temperature (CCT).
3. State and explain Lambert's cosine law of illumination.
4. Define the terms: (i) Solid angle, (ii) Illuminance, and (iii) Luminance.
5. Describe any three important aspects of corridor lighting.
6. A room 8m x 12m is illuminated by 26 fluorescent lamps of 40W each. The average illumination was found to be 400 lux. Determine the co-efficient of utilization. Assume the lamp efficiency as 70 lumens per watt.
7. Explain overall uniformity, longitudinal uniformity, and surround ratio with regard to street lighting.
8. Describe the important design criteria for the threshold zone in tunnel lighting.
9. Discuss the need of aesthetic lighting.
10. State any three factors to be considered while designing statue lighting.

PART B
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Elucidate with the help of neat sketches and supporting table, the different types of lighting systems based on the lighting distribution. (8)
    b) Describe the various quality criteria associated with a good lighting scheme. (6)

OR

12. a) Compare generalized and localized lighting schemes with neat sketches. (7)

b) Describe stroboscopic effect and its adverse impacts. Illustrate how the stroboscopic effect can be minimized in industries. (7)

MODULE II

13. a) Elucidate the significance of polar curves in illumination technology using neat illustration and also describe how Rousseau's construction diagram can be used to determine the mean spherical candle power (MSCP) of a lamp. (8)

b) Explain the working principle of a lux meter with the help of suitable block diagram. (6)

OR

14. a) Describe the salient features of an integrating sphere. Explain any two applications of the integrating sphere for light measurement with neat diagram. (8)

b) Two lamps, one of rating 200 Candela and the other of 400 Candela are hung at heights of 10m and 20m, respectively. The horizontal distance between the lamp posts is 100m. If a photometer is placed midway between the two lamp posts, determine its reading. (6)

MODULE III

15. a) Illustrate any four types of light fixtures used for interior illumination. (6)

b) The total, upward and downward light output from a luminaire are given as 1200 lm, 400 lm, and 600 lm, respectively. Determine the following: (i) ULOR, (ii) DLOR, (iii) LOR, and (iv) Percentage of light energy absorbed in the luminaire. (8)

OR

16. a) Define co-efficient of utilization of a lamp. State the factors on which the co-efficient of utilization depends. (5)

b) An illumination of 75 lux is required in a work plane of size 72m x 15m. The lamps are hung at a height of 4m above the work bench with a utilization factor of 0.5. Assume the lamp efficiency as 14 lumens/watt and the candle power depreciation as 20%. Estimate the number, rating and layout of required luminaires with SHR value less than 1.5. (9)

MODULE IV

17. a) Describe the classification of flood lighting projectors. (6)

b) The front of a building measuring 60m width and 15m height is to be flood lighted by means of projectors placed at a distance of 8 m from the wall. The average illumination required is 50 lux. Determine the number and size of projectors required. Comment on the beam spread. Assume waste light factor = 1.2, maintenance factor = 0.8 and co-efficient of utilization = 0.5. (8)

Lamps available are given below:

Watts	300	500	1000	1500
Lumens	5000	9000	18000	27000

OR

18. a) Illustrate the different types of layouts used in street lighting. (5)
    b) Design a roadway lighting scheme with the following data:
       Width of the roadway = 12m, illumination required = 15lux, mounting height of poles = 9m, arm length = 2m. Assume that lamps are placed on one side of the road. Take co-efficient of utilization as 0.6, light loss factor as 0.7. Two high pressure sodium vapour lamps are available, one with 100W, 9500 lumens and the other with 150W, 16,000 lumens. Choose the most suitable lamp for the design and justify your answer. (9)

MODULE V

19. a) Enlist the requirements of a good sports lighting. (4)
    b) Describe any five characteristic features of monument lighting. (10)

OR

20. a) Explain any four important considerations while designing hospital lighting. (4)
    b) Elucidate any five features of auditorium lighting. (10)

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