

Name of the Examinations: M.E. ILLUMINATION ENGG. 1st YEAR 2nd SEMESTER 2018Subject : DAYLIGHTING DESIGN AND ANALYSIS

Time : Three hours

Full Marks : 50

Use a separate Answer-Script for each part

| No. of questions | Part I | Marks |
|------------------|--|---------------|
| | <u>Answer any 3 Questions</u> <u>(Q.1 carries 18 marks)</u> | |
| 1. a) | What do you mean by sky model? How is it important in daylighting design? | |
| b) | Estimate the luminance of the sky element ($L_{\gamma\alpha}$) under the cloudless turbid sky (CIE sky Standard VI.5) in the direction describe by azimuth $\alpha = 160^\circ$ from North, vertical elevation is $\gamma = 30^\circ$, while the sun altitude is $\gamma_s = 36^\circ$ and sun azimuth $\alpha_s = 157^\circ$ using SSLD model of CIE. The value of parameters for the luminance distribution on the sky of type VI.5 are $a = -1.0$, $b = -0.15$, $c = 16$, $d = -3.0$, $e = 0.30$ and the zenith luminance for the site is given as $L_{vz} = 4259 \text{ cd/m}^2$. | 4+14 =18 |
| 2. a) | Write down the Mathematical expression for Perez "All-Weather" Sky Luminance Distribution model. Briefly describe the effect of each coefficient on the model's skylight distribution pattern. | |
| b) | What is luminous efficacy? How global and diffuse luminous efficacy are measured in practice? What are the inputs parameters to the "Luminous Efficacy Model" by Perez et al.? | 8+8 =16 |
| 3. a) | What are the daylight parameters measured in a research class daylight measurement station? | |
| b) | What is Sky Simulator? What are the advantages conducting model study under Sky Simulator? | |
| c) | What are the available types of Sky Simulator? Give a brief description of any one. | 2+4+10 =16 |

Name of the Examinations: **MASTER IN ILLUMINATION ENGG FIRST YEAR
SECOND SEMESTER - 2018**

Subject : **DAYLIGHTING DESIGN AND ANALYSIS**

Time : Three hours

Full Marks : 50

Use a separate Answer-Script for each part

| No. of questions | Part I | Marks |
|------------------|---|-------------|
| 4. a) | What do you mean by lighting control strategy? Which are the attributes that makes smart lighting system an attractive platform to realize the promise of IoT application in a building? | |
| b) | What do you mean by daylight harvesting or daylight adaptation? Describe the ways of daylight harvesting in a building. What are the demerits of smart lighting control with light sensors? | 4+12 =16 |

Examination: M.E. Illumination Engineering 2nd Semester 2018

Time: 3 Hours

Full marks 100

Subject: Daylighting Design & Analysis

Use separate Answer script for each Part

Part-II

Answer Q.No. 1 and any two questions

Q.1. Answer any six -

- A) Illustrate a typical sun path diagram and mention its applications.
- B) Diffuse component of daylight is preferred than its direct component to design daylighting systems -- explain.
- C) Write down the window design formula and mention its initial assumptions.
- D) Visible light transmission coefficient is different from the transmission coefficient for a glazing material -- explain.
- E) The diffuse luminous efficacy of daylight is higher than the global luminous efficacy when measured simultaneously -- explain.
- F) UGR model is not applicable to evaluate discomfort glare due to window system explain.
- G) What do you understand by low-e glazing material?

3x6 = 18

- Q.2. A) Define Daylight Factor(DF) and derive the expression of sky component(SC) of DF.
B) How the expression of SC is to be modified to compute externally reflected component?

10+6 = 16

Q.3.A) Define Daylight Coefficient(DC). Why DC method is applicable to all sky conditions?

B) Derive the expression of DC for computation of point-specific horizontal illuminance and vertical illuminance.

6+10 = 16

Q.4. A) Briefly discuss daylight metrics to be considered while designing a daylighting system.

B) Mention some strategies adopted in contemporary daylighting design procedure.

12+4 = 16

Q.5. A) Why both the U-value and Solar Heat Gain Coefficient are to be considered during selection of glazing material?

B) Briefly discuss the working principle of a modern daylighting systems used in practice.

4+12 = 16

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