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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

I SEMESTER M.TECH (ENERGY SYSTEMS & MANAGEMENT)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: LIGHTING SCIENCE: DEVICES & SYSTEMS [ELE 5104]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 18 November 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. With relevant sketches, explain the different types of reflections in accordance with the propagation of light. ***(04)***

1B. With the help of spectral eye sensitivity curve, explain the three types of visions. ***(04)***

1C. A full radiator when heated to 3027°C gives a maximum radiation of $5*10^{12}$ w/m^2 at a wavelength of 872.1 n-m. Determine the temperature and maximum radiation at a wavelength of 555 n-m. ***(02)***

2A. Define the following:

(i) Luminance Intensity
(ii) Illuminance
(iii) Luminance
(iv) Point Source ***(04)***

2B. A 1000 W lamp with an efficiency of 0.85 watts/Cd gives a uniform illumination over an area of 10 m diameter. Half of the lumen output reaches the working plane directly and the other half through a reflector having an efficiency of 80%. Determine the illuminance on the working plane. ***(02)***

2C. A room of dimension 10 m X 6 m and height 3 m has a lamp of uniform intensity 300 Cd at the centre. The drop of the lamp from the ceiling is 0.5 m. Calculate the illumination due to lamp

(i) directly below the lamp on the floor
(ii) bottom corners of the room
(iii) midway at the bottom of the walls. ***(04)***

3A. Explain the VI characteristics of low pressure gas discharge phenomenon. ***(04)***

3B. With a neat diagram, explain the construction of high pressure mercury vapor lamp. ***(04)***

3C. Comment on the colour rendering index and lamp life of a fluorescent lamp. ***(02)***

4A. With relevant sketches, bring out the differences in the light distribution of circular reflectors for different positions of the source. ***(02)***

4B. Explain the different techniques used for the measurement of photometric data of a luminaire using gonio-photometer and light sensor. ***(04)***

4C. The photometric test data of a luminaire having a lamp of nominal flux 14200 lm is given below:

Angle	0	10	20	30	40	50	60	70
Luminous Intensity	2136	2043	1926	1758	1613	1481	1289	1108
Angle	80	90	100	110	120	130	140	150
Luminous Intensity	992	748	582	312	196	87	46	19

Determine the total lumen output using Zonal Integration method. Also, calculate LOR, DLOR and ULOR. ***(04)***

5A. What is the necessity of screening device? Explain the different types of screening devices. ***(04)***

5B. A room of length 20 m, width 8 m and height 6.5 m is to be illuminated with ceiling mounted luminaires having a suspension of 0.75 m. Determine the glare index using the glare index table given below:

Room Dimension		GI
X	Y	
1H	4H	16
1H	6H	19
2H	4H	23
2H	6H	28

(02)

5C. Write brief notes on the following tests to be conducted on a luminaire:

(i) Rain proof test

(ii) Dust proof test ***(04)***