Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, JUNE 2018

SUBJECT: LIGHTING SCIENCE: DEVICES & SYSTEMS [ELE 4007]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 22 June 2018** **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 of visible light. ***(03)***

1B. With a neat spectral eye sensitivity curve, explain the three types of vision. ***(04)***

1C. The upper hemisphere of a glass globe is silvered and has a reflectance of 90%. The lower hemisphere is translucent with 75% transmittance. The sphere has a dia of 0.5m with a 100 Cd lamp at its centre. Find the illuminance inside lower hemisphere and luminance exitance on outside of the lower hemisphere. ***(03)***

2A. Starting from the Planck's modified equation, deduce Stephan-Boltzmann law for total radiated power density from a black body radiator. ***(03)***

2B. Explain the following:

(i) Colour rendering
(ii) Colour temperature
(iii) Lambert's Cosine law ***(03)***

2C. A corridor is lighted by 5 lamps each of 200 Cd spaced 10 m apart. They are suspended at a height of 5 m above the centre line of the corridor. Find the illuminance at a point on the floor directly below the centre lamp. ***(04)***

3A. With relevant sketches, explain the construction and working of Fluorescent lamps. ***(05)***

3B. Explain the working of High Pressure Mercury Vapour lamps. Mention its advantages and disadvantages. ***(03)***

3C. Explain the advantages of LED lights over other types of lamps. ***(02)***

4A. Explain the functions of the following as light control elements:

(i) Prismatic Controllers
(ii) Fresnel lens
(iii) Diffusers ***(03)***

4B. With relevant sketches, explain the graphical method of calculation of total flux output of a luminaire. ***(03)***

4C. The photometric test data of a luminaire having a lamp of nominal flux 6220 lm is given below. Determine the total lumen output using Zonal Integration method. Also, calculate LOR, DLOR and ULOR

Angle	Luminous Intensity	Angle	Luminous Intensity	Angle	Luminous Intensity
0	1412	60	444	120	98
10	1366	70	286	130	94
20	1340	80	156	140	86
30	1230	90	114	150	64
40	1088	100	138	160	56
50	786	110	114	170	42

(04)

5A. Explain the different techniques used for the measurement of photometric data of a luminaire using gonio-photometer and light sensor. ***(04)***

5B. Explain how the following tests are conducted for a luminaire:

(i) Mechanical test
(ii) Electrical test
(iii) Thermal test ***(03)***

5C. A room measuring 13 m long and 6.5 m wide has ceiling mounted luminaires at the height of 2.5 m from the floor. Determine the glare index, using the glare index table given below:

Room Dimension		GI
X	Y	
4H	8H	17
4H	12H	18
6H	8H	19
6H	12H	20

(03)

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