Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL 2018

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

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 26th April 2018** **Max. Marks: 50**

Instructions to Candidates:

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

1A. With reference to the propagation of light, explain the following:

(i) Absorption
(ii) Transmission
(iii) Refraction
(iv) Polarization ***(04)***

1B. With a neat sketch, explain the different parts of the human eye. ***(04)***

1C. A 200 W lamp is suspended 0.5 m below the ceiling of a room of height 4 m and gives a uniform illumination over an area of 8 m diameter. Efficiency of the reflector is 70% and efficiency of lamp is 0.9 watts/Cd. Determine the illuminance on the working plane of height 1m. ***(02)***

2A. What is a black body radiator? Draw and explain the spectral energy distribution curve of a black body radiator for different temperatures. ***(03)***

2B. Explain the following:

(i) Luminance
(ii) Light-watt
(iii) Lambert's cosine law ***(03)***

2C. A conference hall of length 15 m and width 6 m is lit by 5 lamps each on the two longer walls at a height of 3 m from the ground. The lamps are placed equidistant from each other and also from the side walls. If the luminous intensity of each lamp is 500 Cd, determine the illumination at the centre of the hall. ***(04)***

3A. With a neat graph of VI characteristics, explain the different phenomena in a low pressure gas discharge. ***(04)***

3B. With a neat sketch, explain the construction of High Pressure Sodium Vapour lamp. ***(03)***

3C. Explain the working principle of Metal Helide lamp. Comment on its life and Color Rendering Index. ***(03)***

4A. With neat diagrams, explain the light distribution patterns in

(i) Circular reflectors
(ii) Parabolic reflectors ***(03)***

4B. With necessary sketches, explain the classification of light distribution in luminaires based on

(i) shape of polar curve

(ii) light output above and below the horizontal plane ***(03)***

4C. An industrial luminaire consisting of two, fluorescent lamps, each with a nominal flux of 4250 lumens, is tested using a Gonio-photometer. The test data are given in table. Find the total luminous flux output of the luminaire and LOR, DLOR and ULOR using zonal integration method.

Angle in Degrees	Luminous Intensity
0	1345
10	1425
20	1360
30	1270
40	1120
50	1030
60	915

Angle in Degrees	Luminous Intensity
70	780
80	615
90	390
100	180
110	85
120	40
130	15

(04)

5A. With a neat diagram and calculation procedure, explain the Rousseau diagram method of calculation of total flux output of a luminaire. ***(03)***

5B. Explain the process of Ingress Protection tests to be conducted on the luminaires. ***(04)***

5C. An electrical machines laboratory of length 21 m, width 10 m and height 6 m is illuminated with ceiling mounted luminaires having a suspension of 0.3 m. Determine the glare index using the GI table given below.

Room Dimension		GI
X	Y	
1	4	17.4
1	6	18.2
2	4	18.6
2	6	19.8
3	4	20.9
3	6	22.4

(03)