Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER M.TECH (EMAL)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: LIGHTING SCIENCE: DEVICES & SYSTEMS [ELE 507]

REVISED CREDIT SYSTEM

Time: 3 Hours 26 November 2015 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A. With reference to spectral eye sensitivity curve, explain the three types of visions. **(3)**

1B. From fundamentals and with usual notations, derive an expression to obtain the total energy being emitted by a blackbody. **(3)**

1C. A LED spot light has the photometric characteristics as given in Table 1C. It is mounted at a height of 6m from the ground aiming at point 'Q' 10m away from its base. The face diameter of the spot light is 20cm. Find horizontal illuminance and luminance:

a. At the point 'Q'.

b. At point 'P' which is at midway between the line joining the base of the lamp and point 'Q'.

Table 1C

θ in deg	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Intensity in cd	1260	1237	1191	1112	1027	945	863	783	690	602	524	445	359	283	207	135	70	21	0

(4)

2A. Briefly explain with a neat sketch the best arrangement used to obtain the photometric characteristics of a luminaire. Draw the photometric characteristics of a fluorescent luminaire. **(4)**

2B. Comment on the beam spread of the following.

1. Circular reflector – Source at center of curvature.
2. Parabolic reflector – Source inwards to focus.

(4)

2C. A point source luminaire has an output as shown by the polar curve in Figure 2C. It is mounted 2 meters above the working plane and is fitted with an 18 Watt Compact fluorescent lamp whose output is 1500 lumens. Calculate:

(i) The illuminance on the working plane directly under the lamp

(ii) The illuminance on the working plane 2 metres to one side. **(2)**

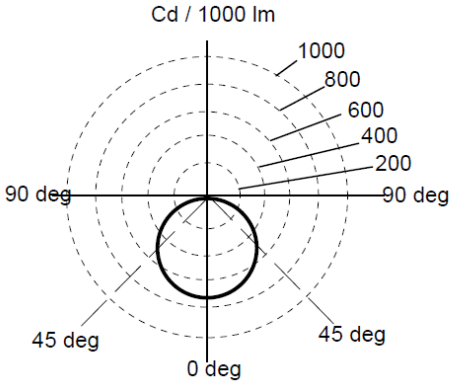

Figure 2C

3A. An industrial fluorescent luminaire housing 2x36W FTL was tested on a gonio-photometer and the test results are as given in the Table 3A.

LDL of each lamp = 3350 lm

Determine DLOR & ULOR

Table 3A

° (deg)	0	10	20	30	40	50	60	70	80	90	100	110	120
Avg Intensity (cd/1000lm)	92	96	98	94	90	84	78	70	60	50	30	20	8

(5)

3B. Define Colour Temperature, Correlated Color Temperature and Colour Rendering Index of a light source. Explain its significance on light source selection with examples. Discuss the other factors to be considered for the selection of light sources **(5)**

4A. Write a brief note on classification of luminaire **(5)**

4B. Draw and explain the Voltage – Current characteristics of Low Pressure Gas discharge lamps **(5)**

5A. What is a ballast? List the types of ballast and explain each of them. **(4)**

5B. Write a note on Rosseus Method for evaluation of luminous flux. **(3)**

5C. List and explain the six basic rules for energy efficient lighting system. **(3)**

6A. Write a note on C.I.E Chromaticity diagram. **(5)**

6B. Briefly explain the calculation of interior illuminance due to daylight using Waldram Diagram **(5)**