Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

(A constituent Institution of MAHE, Manipal)

I SEMESTER M.TECH (ENERGY SYSTEMS & MANAGEMENT) END SEMESTER EXAMINATIONS, NOVEMBER 2018

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

REVISED CREDIT SYSTEM

Time	e: 3 Hours	Date: 22, November 2018	Max. Marks: 50			
Instructions to Candidates:						
	 Answer ALL the question 	S.				
	Missing data may be suita	bly assumed.				
	 Draw neat sketches wher 	ever required.				
1A.	List the different regions o infrared radiation.	f electromagnetic spectrum. Mention the app	lications of (02)			
1B.	Explain the role of different	components used in a typical LED bulb.	(02)			
1C.	Draw a neat sketch of human seeing nearby and distant o	n eye and label the parts. How does eye adjusts bjects.	itself while (03)			
1D	Define the terms : Luminous	s intensity, Illuminance and Luminance	(03)			
2A.	With a neat sketch illustrapolarized light.	ate polarization of light. What are the app	lications of (02)			
2B.	With a neat sketch, explain radiator also the write relev	n the spectral energy distribution curve of a rant governing equations with proper notation	blackbody s. (03)			
2C.	An incandescent lamp ass diameter of 10cm. Find the	umed spherical has a uniform intensity of luminance and luminous exitance emitted from	200cd and n the lamp. (02)			
2D.	Four lamps each of 2000cd x 10m x 6m (LWH) rectangu of the room at the floor leve	are ceiling mounted midway between each wa lar hall. Find the illuminance at the center and l.	all of a 20m the corners (03)			
3A.	What are primary colors? Di color mixing.	fferentiate between additive color mixing and	subtractive (02)			
3B.	With a neat sketch explain Why tungsten is used a filan	the construction and working of an Incande nent in these types of lamps?	scent lamp. (03)			
3C.	What is the band gap rang emission? Assume : 1eV = 1	ge in eV for semiconductors to be considere .602 x 10 ⁻¹⁹ J	ed for light (02)			
3D.	Obtain the expression for Zo luminous flux.	onal factor as referred to Zonal method for eval	uating total (03)			

4A.	Explain how luminaires are classified based on symmetry of light distribution.	(02)
4B.	Illustrate using neat sketches, the effect of moving the light source away or towards the focus of a parabolic reflector affects the light distribution.	(03)

- **4C.** What is the need for a screening device? What the different types of screening devices? **(02)**
- 4D. A college laboratory of 20m x 10m dimensions and with a ceiling height of 5m requires an average illuminance of 500 lux on the working tables of 85cm in height. Assuming a utilization factor of 0.6, maintenance factor of 0.9 and a S/Hm ratio = 1.0 (max). Suggest a suitable lighting scheme using fluorescent lamps of 36W with output of 3350 lumens per lamp. Also calculate the lighting power density. (03)
- **5A.** Determine the initial glare index for the facility discussed in Q4D. The following table can be made use for calculations. Assume the direction of view along the length of the room.

Room di	Glare index		
X	Y	ulai e muex	
214	4H	14.2	
211	6Н	16.3	
3Н	4H	17.8	
511	6Н	19.1	

5B.	Suggest few energy conservation recommendations for lighting facilities.	(03)
5C.	What are key design parameters to be considered while designing lighting schemes for sports facilities?	
5D.	What nurnose does road lighting installations serve? Draw the different types of road	

5D. What purpose does road lighting installations serve? Draw the different types of road lighting pole arrangements? **(03)**

(02)