Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH ONLINE EXAMINATIONS, JANUARY- FEBRUARY 2021

INTRODUCTION TO LIGHTING DESIGN [ELE 4302] (OPEN ELECTIVE)

REVISED CREDIT SYSTEM

Time:	3 Hours E	Date: 06 February 2021	Max. Ma	rks: 50			
Instru	instructions to Candidates:						
	✤ Answer ALL the questions.						
	 Missing data may be suitably 	assumed.					
1A.	A corridor, 40m long, is lighted l suspended at a height of 4m abo directly below the centre lamp.	by 5 lamps each of 500 Cd, spaced 10m apart. ove the centre line of the corridor. Find the illu	They are iminance	(04)			
1B.	Explain with an example and re luminous efficacy of a light sour	elevant sketches, how the spectral eye sensit ce are related?	ivity and	(06)			
2A.	Illustrate "laws of illuminance"	with neat sketches and what are their limitation	ons?	(04)			
2B.	For a room of 5m x 4m size and the center of the room. Photom and the luminaires are suspende	d 4m height, a 4x40watts FTL luminaire is mo netric data is given below. Work plane height ed at a height of 0.5m from the ceiling. Calcula	ounted at is 0.85m ate				
	a) Lumen output of each lab) Luminous Efficiency of a	mp. light source					

- c) The horizontal illuminance at all corners of the room on the work plane.
- Given: luminaire efficiency and luminaire output of 50% and 4908 lumens respectively.

Angle (deg)	5	15	25	35	45	55	65	75	85
Intensity (cd/klm)	272	244	202	156	106	68	42	21.5	6

(06)

(04)

(06)

(04)

- **3A.** Explain, three methods of white light generation using LEDs. And list out advantages and disadvantages of any two methods.
- **3B.** With relevant diagram, explain the relation between Wien's displacement law and spectral energy distribution of a blackbody radiator. And Using Wein's equation, tabulate the spectral radiant exitance values for the wavelength ranging from 350nm to 800nm for a black body radiator working at temperatures of 4000 K and 7500 K. Hence prove the validity of Wein's displacement law. Assume 50nm steps.
- **4A.** Briefly explain with neat sketch the different techniques used to obtain the photometric characteristics of a luminaire.

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4B. "The extent to which the lighting systems design is over designed at the start is dependent on how well the maintenance program is carried out once the system is installed." Justify this statement with example and using relevant factors.

(06)

5A. Justify the following with example

Cases	Room Type	RCR	К	CU
1	Small room	Increases	Decreases	Decreases
2	Large room	Decreases	Increases	Increases
3	Short room	Decreases	Increases	Increases
4	Tall room	Increases	Decreases	Decreases

Where: RCR (Room Cavity Ratio), K (Room Index) and CU (Coefficient of utilization) (04)

- **5B.** A room measuring 14m x 8m is to be lit to a lighting level of 500lux. Height of the room is 4m and the luminaires are to be ceiling mounted. The light loss factor is of 0.8. Design and suggest the best energy efficient lighting scheme using the available lamps. Smax /Hm to be 1.5. Justify the answer in terms of LPD. Show the disposition of the selected scheme. Available lamps are
 - i) FTL T5 2x35Watts, 105 lm/watts,
 - ii) CFL 2x36Watts, 80 lm/watts,
 - iii) LED 4x14Watts 80 lm/watts.

Room index	Co-eff. of utilization
1	0.43
1.25	0.48
1.5	0.53
2.0	0.58
2.5	0.63
3.0	0.69

(06)