Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

^{LITE} A Constituent Institution of Manipal University

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: INTEGRATED LIGHTING DESIGN [ELE 439]

REVISED CREDIT SYSTEM

Time: 3	Hour	s Date: 02 January 2017	Max. Marks: 50		
Instructi	ons to				
*	Ansv	wer ANY FIVE FULL questions.			
*	• Miss	ing data may be suitably assumed.			
*	Use	of lighting design hand book permitted.			
1A. V	What a	are the different types of interior lighting methods? Elaborate.	(06)		
1B.	Explai	n how RCR, RI and CU varies for the following types of room.			
	1.	Large			
	2.	Small			
	3.	Tall			
	4.	Short	(04)		

2. A photometric test report of a particular lamp luminaire combination is as follows: Type of lamp: TL'D', Slim line, 26mm dia – 36W

θ (degrees)	0	10	20	30	40	50	60	70	80
Avg. Intensity (Cd/1000lm)	86	92	94	99	101	96	87	75	60

Test Distance is $6m \& S/H_m$ is 1.25. Ceiling, wall and floor reflectances are maintained to be 50%, 30% & 10% respectively. Work plane height is 0.9m & luminaire is suspended by 0.85m from the ceiling. If the dimension of the room is $22m \times 11m \times 5m$, Estimate utilization factor for the room index of 3. Assume 10 degree zones.

3. A structural steel fabrication (manufacturing) area with floor dimensions of 20m×12m has a ceiling height of 5m. Workshop is placed in town outskirts and has annual periodic cleaning. It is to be lit using open-end enamel trough reflector housing energy efficient twin fluorescent tubes. Ensure LPD< 9W/m². The luminaires are to be fixed with their longer axis parallel to the shorter walls and ceiling mounted. Given: luminaire has ULOR = 15%, luminous area = 3000cm². Reflectance of ceiling and walls is 70% and 50% respectively. The floor is relatively dark. Design an energy efficient lighting scheme using RI index method. Also calculate final glare index for the worst condition of observation if initial glare value is 17.

(10)

(10)

4A.	Design suitable flood lighting scheme required to illuminate the upper 40m of a perfectly diffusing surface building of 20m width and 50m height from the ground. An illuminance level of 150 lux is desired. The projectors are to be mounted on towers, at an appropriate distance away from the base of the building. The building surface is rough and has major setback features and architectural projections. Direct lighting fixtures are used, but are poorly maintained. Available lamp is 1000W - Metal Halide - Ellipsoidal. If the projectors are designed to produce a wide beam spread of 50 degrees, suggest appropriate location (distance) for mounting them. Show disposition of circular light patches on the building. And also calculate the total energy cost for 1 leap year if lighting system is operated 11hrs/day and cost/unit is 8rs.	(06)
4B.	Explain the factors that influence quality and quantity criteria for sports lighting?	(04)
5A.	What are the important design consideration for tunnel lighting system?	(02)
5B.	Design an energy efficient lighting system for a single carriage road of width 30 feet. Selected lighting arrangement is staggered. It is desired to maintain an average illuminance of 1.4fc on the road using HPSV 150W lamp. Mounting height of the luminaire is 25 feet. And over hang is 0 feet. Comment on the uniformity of light distribution on the road. Assume LLF= 0.7905.	(08)
6A.	Define V, H and M ratios in Side lighting concept. With relevant sketches explain its significance in illuminance distribution pattern.	(04)
6B.	What is glare? Types of glare? Explain how direct and indirect glare can be reduced.	(06)