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प्रज्ञानं ब्रह्म Manipal	Anipal Institut (A Constituent I	e of Tec Institute of M	hno anipal (logy Univers	, M	an	ipa	al	KNOWLEDGE I	S POWER

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: INTEGRATED LIGHTING DESIGN [ELE 439]

REVISED CREDIT SYSTEM

Time: 3 Hours

03 DECEMBER 2015

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- Missing data may be suitably assumed.
- Use of lighting design hand book permitted
- 1A. Define Light Loss Factor. With relevant sketches and graph explain the factors influencing it. (03)
- **1B.** Explain Local lighting and Localised General lighting. Mention advantages of Localised General Lighting over Local Lighting.
- **1C.** Explain how direct and indirect glare can be reduced.
- **2A.** The photometric test report of a step integral reflector housing 150W HPSV Ellipsoidal lamp is as follows.

θ (Degrees)	0	10	20	30	40	50	60	70	80
E (lux)	185	154	97	62	34	23	15	9	4

The Goniophotometer test was conducted at a distance of 7m. If the luminaire is used to illuminate a factory hall of dimension 20m x 12m x 6.75m, determine CU of the luminaire by British Zonal method. Consider S/Hm as 1.25 and luminaire suspension height as 90cm. Ceiling, Wall and Floor reflectances are 50%, 30% and 30% respectively.

- **3A.** An Air-conditioned NLH class room of MIT, Manipal measuring 10m x 8m x 3.75m is to be lit by Compact Fluorescent Lamp to 360lux. The twin lamp setup is housed in a louvered recessed (module) luminaire. Periodic cleaning was carried out annually. With ceiling and wall reflectances to be 70% and 50% respectively, design an energy efficient lighting layout by RI method to calculate CU. Ensure Light Power Density of less than 14W/m² is maintained.
- **3B.** Explain the design considerations for Transition Zone in Tunnel Lighting.

(03)

(04)

(10)

(08)

(02)

- 4A. A machine shop of dimension 15m x 10m has a ceiling of 5m height. Trunkings are fixed in parallel to the longer walls and trough reflectors each with 2x36W FTL-TLD-Super are attached to it at a height of 4m from floor. The luminaire is classified as BZ4-ACG1 and has a luminous area of 3500cm². Given ULOR = 8% and DLOR = 75%. Ceiling, Wall and Floor reflectances are 50%, 30% and 14% respectively. Find the final glare index for the direction of view parallel to the longer wall.
- 4B. Front face of a building of dimensions 40m x 60m is to be lit to 100lux using 400W Ellipsoidal Metal Halide Lamp. The building has smooth regular surface and direct lighting wide beam reflectors are used. Luminaires are well maintained and periodically cleaned. Design an energy efficient lighting solution maintaining a good uniformity ratio. Show the circular beam projection on building surface. If the projector used has a beam angle of 45° calculate the setback distance.
- 5A. Design a road light solution for a single carriage road of width 20 feet. Selected lighting arrangement is Single sided. It is desired to maintain an average illuminance of 15lux on the road. Mounting height of the luminaire is 25 feet and overhang is 0 feet. Available lamp is Ellipsoidal HPSV 150W. Comment on uniformity of light distribution on the road. Assume LLF = 0.70. (08)
- 5B. Define the following Road lighting parameters:

i) Threshold	Increment
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- ii) Surround Ratio
- 6A. Explain the factors that influence quality and quantity criteria for sports lighting. (03)
- 6B. What are Light shelves? With relevant sketches explain how daylight penetration varies for different types of light shelves. (03)
- 6C. Define \overline{H} , \overline{V} and \overline{M} ratios in Side lighting concept. With relevant sketches explain its significance in illuminance distribution pattern. (04)

(06)

(04)

(02)