Reg. No.									

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER M.TECH (ENERGY MANAGEMENT AUDITING & LIGHTING)

END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: INTEGRATED LIGHTING DESIGN [ELE 502]

REVISED CREDIT SYSTEM

Time: 3 Hours 05 MAY 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.
- Use of Lighting Design handbook is permitted.

1A. Define Light Loss Factor. With relevant sketches and graphs explain the different factors associated for light loss. ***(05)***

1B. Differentiate between Local Lighting and Localized General lighting for interior lighting system. ***(03)***

1C. Explain how direct glare component can be reduced in interior lighting environment. ***(02)***

2A. An Air-conditioned room of dimension 12m x 10m x 4m is to be lit to 250 lux by Compact Fluorescent lamps. The twin lamp setup is housed in a louvered recessed module luminaire. Periodic cleaning was carried out once in every 8 months. With ceiling and wall reflectances to be 70% and 50% respectively, design a lighting layout by RI method to calculate CU. Ensure good light power density of less than $9W/m^2$ is maintained. ***(07)***

2B. In a room of dimension 13m x 6.5m x 3m, the lighting installation consists of metal cylinders for 150W incandescent lamps suspended at a height of 0.5m from the ceiling. Luminous efficacy of the lamp is 13lm/W. The luminaire is classified as BZ4 and LORs are ULOR = 25% and DLOR = 25%. Luminous area of luminaire is 350 cm^2. Ceiling and Wall reflectances are 70% and 50% respectively. Assuming dark floor calculate the final glare index if initial glare index is 17. ***(03)***

3. A sheet metal workshop with dimension 20m x 12m has a ceiling height of 6.5m and workplane height of 0.7m. Workshop is to be illuminated using dispersive industrial reflector housing HPMV lamps. Luminaires are suspended by 0.8m from the ceiling. Ceiling, wall and floor reflectances are 70%, 50% and 10% respectively. The photometric test data of selected lamp-luminaire is given below. Calculate the CU by British Zonal method. The photometric test was conducted using Goniophotometer at a distance of 6m. Given: LOR of the luminaire is 81%

Θ	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
I	18	28	33	31	28	24	16	11	6	4	9	10	6	2	0

(10)

4A. Design a road light solution for a single carriage road of width 30'. Selected lighting arrangement is staggered. It is desired to maintain an average illuminance of 30lux on the road. Mounting height of the luminaire is 25' and overhang is 3'. Available lamps is Tubular HPSV 250W. Comment on uniformity of light distribution on the road. Assume LLF = 0.70 ***(08)***

4B. Explain the design considerations for Transition Zone in Tunnel Lighting. ***(02)***

5A. It is desired to flood light the front face of a building of width 42m and 16m height. Illumination level required is 75lm/m^2. Assume CU=0.4, WLF=1.2 and DF=1/1.3. Lamps given are as follows.

I. Halogen, 1000watt, 20lm/watts

II. MH, 250watt, 100lm/watts

Estimate the number of circular projectors required on each scheme. If the projectors have a beam spread of 30°, calculate the distance from the building at which projectors to be placed. ***(05)***

5B. With relevant sketches explain the impact of illuminance for variation in 'H' ratio for different 'M' ratio in side lighting concepts. ***(03)***

5C. Plot the impact of illuminance due to variation in O ratio for Top lighting concept. ***(02)***

6A. Calculate the number of lamp-luminaires required to illuminate a Class-II level Tennis court. Available lamp is Metal Halide 2000W, 195000lm and is housed in a Wide beam spread luminaire. Luminaires are mounted at a height of 40' from the ground with a Setback Distance of 20'. Assume Light Loss Factor of 0.7. ***(05)***

6B. With relevant sketches and graphs, explain the light distributions patterns for different values of 'D' ratio for following Sun control and shading devices.

i) Overhang

ii) Louvres ***(05)***