Ref: Ex/PG/IlluE/T/127A/2024

M.E. Illumination Engineering 1st Year 2nd Semester Examination 2024

Time: 3 Hours Full marks 100

Subject: Computer Aided Lighting System Design

Part-I (50 Marks)

Use separate Answer script for each Part

ANSWER ANY THREE QUESTIONS

Q.1 CARRIES 18 MARKS

Q.1. A) Write down primary objectives of roadlighting design.
B) Illustrate the conventional pole layouts with suitable diagram and write down the thumb rules usually followed during selection of pole layout for a given road width.
C) For roadlighting design, luminance based approach is more realistic than illuminance based approach – justify.
D) How 'Unit Power Density' is estimated for roadlighting installations of different pole layout?

18

Q.2. A) What do you understand by 'luminance contrast' and 'threshold contrast'? How 'Threshold Increment' is considered as a measure of Disability Glare for a roadlighting installation?
B) Discuss the steps of computation of 'Threshold Increment'.

16

Q.3. A) What are the luminance based design parameters of a roadlighting design?
B) Write down steps of computation of illuminance based road design parameters.

16

Q.4. A) Discuss the classification of sportslighting depending on (i) type of sports and (ii) level of importance.
B) Write down the sportslighting design parameters applicable for both indoor and outdoor sports.
C) Discuss any two design parameters applicable only for televised sports.

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Q.5. A) What do you understand by (i) side-mounted and (ii) corner-mounted pole arrangement in case of a sportslighting arena.
B) How luminaire aiming is done with combinations of floodlight luminaires of different beams to achieve design parameters?
C) How Glare rating is computed for area lighting?

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[Turn over

Ref. No. EX/PG/IlluE/T/127A/2024

M. E. IN ILLUMINATION ENGG. FIRST YEAR SECOND SEMESTER EXAMINATION, 2024
(1st Year 2nd Semester)

SUBJECT : COMPUTER AIDED LIGHTING SYSTEM DESIGN

Full Marks -100
(50 marks for this part)

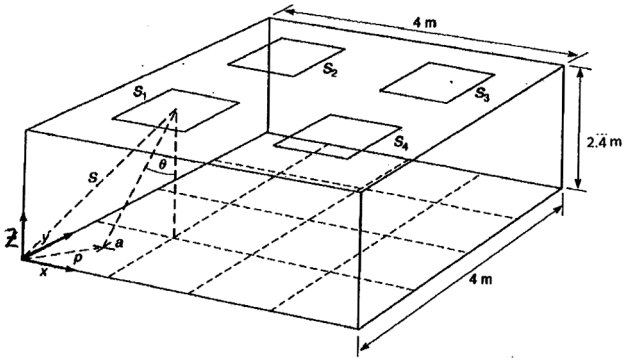
Time : Three hours

Use a separate Answer-Script for each part

No. of questions	Part II (50 Marks) Answer any two questions	Marks
1. a)	Briefly explain 'CSP' index. Write down an algorithm to find the CSP index.	10
b)	Calculate the CSP index for the following values. GI = 15, E_{cyl} = 254 lux, E_n = 432 lux, E_{min} = 382 lux, LOR = 1.46, DF = 0.22, R_a = 87.	10
c)	Define 'Equivalent Sphere Illuminance (ESI).' Briefly explain the process of evaluation of ESI.	5
2.a)	Find out the indirect component of mean room surface illuminance by Cuttle's method in a room shown below having four luminaires S_1, S_2, S_3 & S_4. Each luminaire contains two 36 W CFLs having 3200 lumen each. Considering ρ_F = 0.38, ρ_W = 0.6, ρ_C = 0.82 MF = 0.62. DF(F) = 0.3, DF(W) = 0.22. Calculate the direct component of illuminance at point 'a' in the below figure using vector method. Hence find out cubic illuminance at that point. Use the intensity distribution table given below:	15

Angle in deg.	0	5	10	15	20	25	30	35	40
I in cd/1000	220	220	216	210	207	200	190	175	140

Angle in deg.	45	50	55	60	65	70	75	80	85	90
I in cd/1000	110	82	70	40	30	22				



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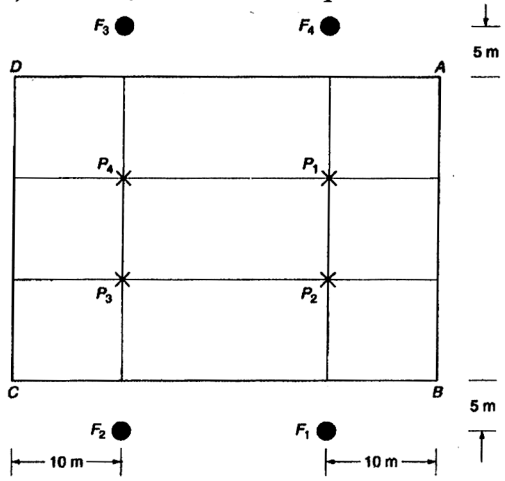
(50 marks for this part)

Time : Three hours

Use a separate Answer-Script for each part

b)	Briefly explain about VCP.	4
c)	Define 'Cylindrical Illuminance' and 'Hemispherical Illuminance.'	6
3.a)	Discuss the main design criteria of Floodlighting design.	9
b)	Write down the objectives of emergency lighting. Discuss about various power supply systems for emergency lighting.	10
c)	Explain any maintained and non-maintained emergency lighting circuits with necessary diagrams.	6
4.a)	How uniformity is achieved during floodlighting design? Explain with the training plan.	4
b)	Discuss the method of computation of luminous flux within boundary for any floodlight.	6
c)	The area *ABCD,* a rectangular park of 40m X 30m dimension shown in the below figure is to be lit by four numbers of 400 W SON floodlights F_1, F_2, F_3 and F_4 symmetrically placed at a mounting height of 9 m and aimed with their peak luminous intensity directed towards P_1, P_2, P_3 and P_4 respectively. Using the iso-candela and zonal flux diagram below, Find the average horizontal illuminance and the horizontal illuminance at each corner and in the centre of the area. Consider the lamp luminous flux as 28500 lm, the lamp lumen maintenance factor *(LLMF)* as 0.9, the luminaire maintenance factor *(LMF)* as 0.85, and the atmospheric transmission as 0.95. 	15

ISOCANDELA AND ZONAL FLUX DIAGRAM