

**B.E. ELECTRICAL ENGG.FOURTH YEAR SECOND SEMESTER EXAM,2018****ADVANCED LIGHTING DESIGN****Time : Three hours****Full Marks : 100**

(50 marks for each part)

**Use separate Answer-script for each part****PART – I****Neatness carries 2(two)marks****Question no.1 is compulsory**

1. A rectangular area of 44m×36m dimension is illuminated by placing four poles at the middle of each side of the area. The poles are of 15 m height and each of them carries 8x400W SON floodlights. Each pole is located 1.0m outside the boundary line of the area. Using the given zonal flux diagram of Fig. 1, and showing each step clearly, find out the followings:

- i) the Utilization Factor
- ii) the average Horizontal Illuminance on the area

Given: the total initial lamp lumen = 48 Klum, the depreciation factor = 0.8 , the maintenance factor = 0.75, the atmospheric loss factor = 0.9.

Photocopy of Fig.1 is attached , submit this.

8+3=11

**Answer any Three**

2.a) Explain with necessary diagram Parallel Plane Aspect Factor. Find out this , for linear diffuser having intensity  $I(\alpha)=I(0)\cos(\alpha)$ . What will be the value of Perpendicular plane Aspect Factor for it? 3+4+2=9

b) A tube light is mounted direct above the front-edge of a work bench of 0.8 m width. Both are 1.2 m long and the mounting height is 2.2 m. The transverse intensity is 620 cd at all angles. Find the illuminance at the centre above the front edge. 04

3. a) Describe the hemispherical method of Illuminance calculation for Area sources and hence find the Illuminance at a point on the floor from large right angled Triangular shaped ceiling, Rectangular shaped ceiling and Wall. Draw the necessary figures. 3+4+3= 10

b) If a diffused disc has luminance of  $750\text{cd/m}^2$  and radius of 1.4ft., what will be the illuminance value on a parallel plane 4.5m below? 03

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4.a) Discuss the advantages of battery powered inverter based Maintained Emergency Lighting system over Motor generator based system. Draw one block diagram for each type. 3+2=5

b) What are the main differences between 3+3+2=8

i) Indoor lighting and Outdoor Floodlighting?

ii) Classification of Flood-Lights as per Indian Standard and American Standard .

iii) Average Lux level ranges needed in the car parking area and International sports stadium .

5) i) For a clear day, calculate the attenuation of luminous intensity due to atmospheric loss, for 180m, 280m and 350m distances from a high mast of 50m height. 03

ii) Design the lighting scheme & sketch the layout of a storage area of 100 ft x 1000ft dimension with 50 lux Illumination. Use the Quick selector method and consider the graphs of Fig.2. 04

iii) Write the accepted standard conditions which are considered at the time of evaluation of VCP. Write down the limitations of VCP. 4 +2=6

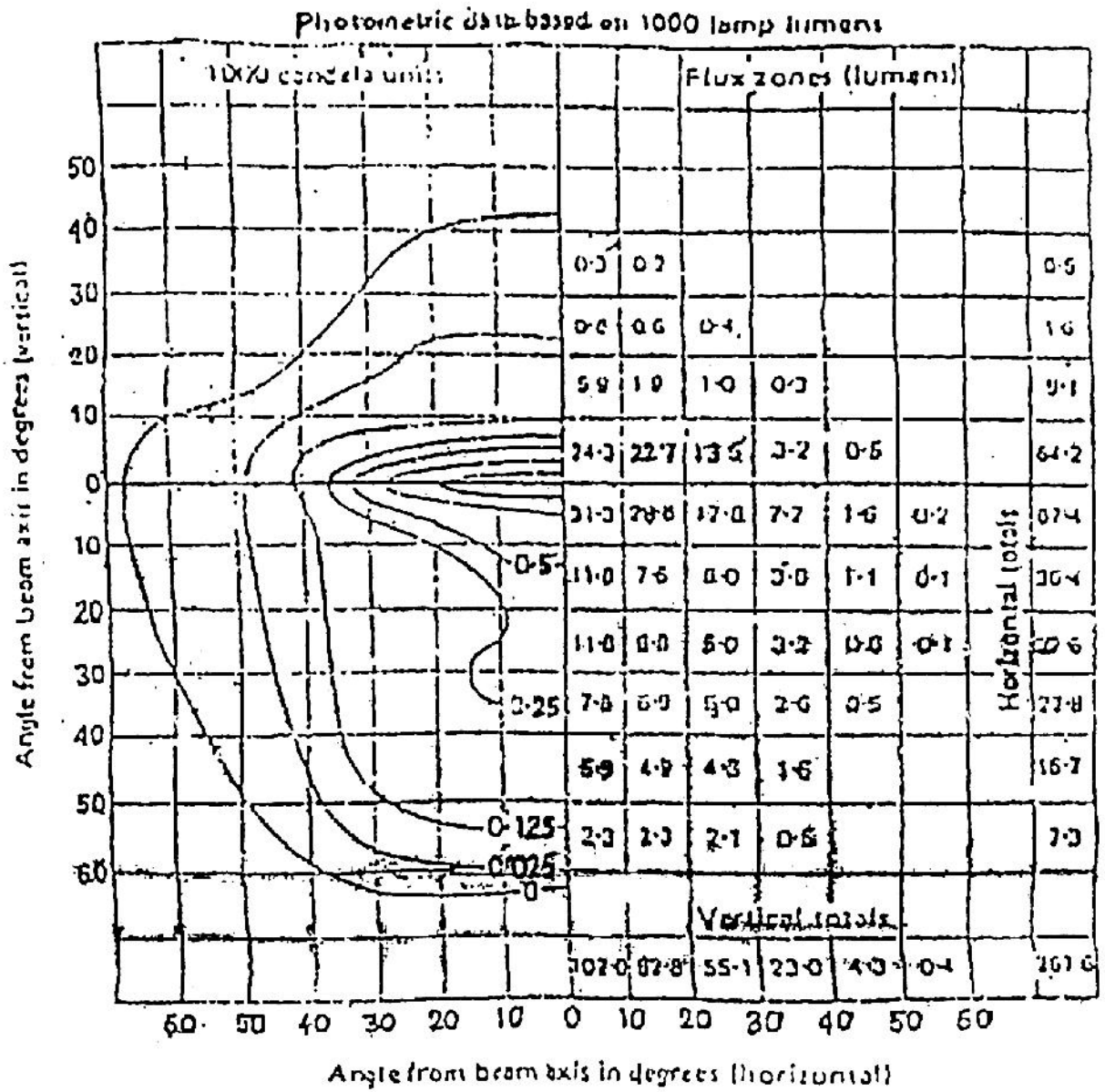


Fig. 1 Zonal flux and isocandela diagrams for floodlighting.

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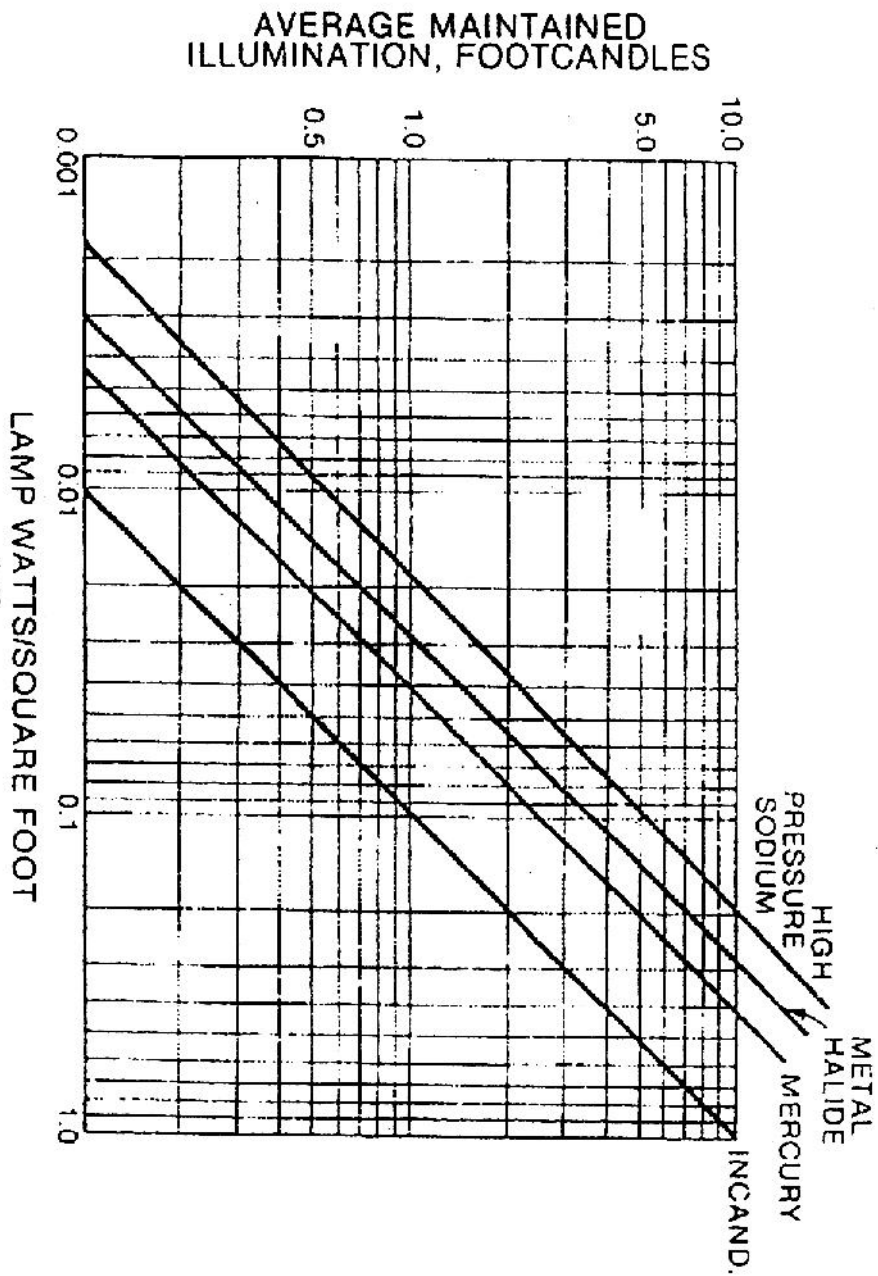


Fig. 2

**B.E.ELECTRICAL ENGG. Examination 2018**  
**[4<sup>th</sup> Year; 2<sup>nd</sup> Semester]**  
**Subject: Advanced Lighting Design**

Time: 3 hours

Use Separate Answer script for each part

Full Marks:100  
(50 marks for each Part)

Part-II

ANSWER ANY THREE QUESTIONS

Question No. 1 carries 18 marks

Q.1.

- A) Write down the objectives of roadlighting.
- B) Draw typical roadlighting installation geometry and hence explain the effect of some design variables, viz. overhang; tilt angle and pole spacing on the design parameters.
- C) Define Daylight Coefficient (DC) and hence show that DC method is applicable as daylight prediction tool for all types of sky condition.
- D) Derive, from the basic law of illuminance, the expression of point-specific horizontal illuminance due to a sky-patch limited by horizontal and vertical angles of acceptance.

(3+6+3+6=18)

Q.2.

- A) Define daylight factor and hence derive the expression of average daylight factor for an interior. Mention the basic assumptions and show that this expression can be used as a window design tool.
- B) Discuss daylight integrated artificial lighting system with suitable example. What type of lamp system and lighting control are to be employed to save significant amount of energy by using above system?

(8+8=16)

Q.3.

- A) How pole layout is selected for different combinations of pole height and road width? Mention its theoretical basis. Write down, in steps, the application of coefficient of utilization chart of a typical roadlight luminaire to design a roadlighting system.
- B) Define "Throw" and "Spread" of a roadlight luminaire and hence describe how these are utilized to achieve desired longitudinal and transverse uniformity of illuminance over road surface during roadlighting design.

(8+8=16)

Q.4.

- A) Briefly discuss the CIE standard sky luminance distribution model.
- B) How daylight luminous efficacy values are measured in practice?

(10+6=16)

Q5.

- A) Discuss the procedure to estimate capital cost and running cost of a proposed indoor lighting installation. How the pay back method is applied to identify cost-effective lighting solution among a number of design alternatives.
- B) What is the working principle of a PIR sensor? Discuss its coverage pattern when mounted on ceiling and wall.

(10+6=16)