

EX/EE/ PE/B/T /421F/ /2022

**B.E Electrical Engg.4<sup>th</sup> Year 2<sup>nd</sup> Sem. Examination, 2022**  
**(4<sup>th</sup> Year, 2<sup>nd</sup> Semester)**

**ELECTIVE-II ADVANCED LIGHTING CALCULATION & DESIGN**

**Time : Four hours** **Full Marks : 70**  
(35 marks for each part)

**Use separate Answer-script for each part**

**PART – I**

Answer Q no.1

1. A square area of each side 42m length is illuminated by placing one pole at the middle of each side of the area. The poles are of 15 m height and each one carries 4x400W SON floodlights. Using the given diagram of Fig. 1, and showing each step clearly, find out the following:

- i) the Utilisation Factor,
- ii) the average horizontal illuminance on the area , when all the lamps are made ON.
- iii) a) If 25%, 50% and 75% of the lamps are made OFF, what illuminances will you get?  
b) Draw a curve showing the variation in illuminances.
- iv) How will you save power from 5pm to 5am switching the lamps properly as well as providing necessary illuminance to public/users?

Given: the total initial lamp lumen = 48.5 Klm, the depreciation factor = 0.88, the maintenance factor = 0.6, the atmospheric loss factor = 0.7. Photocopy of Fig.1 is attached, submit the diagram if used.

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[ Turn over

Answer Any two Questions from rest

2. (a) Explain the method of Illuminance calculation from a circular shaped diffused area source .If it is of 3ft diameter, find the illuminance at a point vertically 8ft.below. If the source diameter is made doubled, four times, what will be the illuminance values at that point?

Drawing a graph, show the variation. 5

(b)Write short notes :

(i) One Floating type and one Machine operated type Emergency Lighting system. 2

(ii) Classification of Flood-Lights as per Indian Standard and American Standard. 4

3. (a) A tube light is mounted direct above the front-edge of a work bench of 0.8 m width. Both are 2.5 m long and the mounting height is 2.2 m. The transverse intensity is 500 cd at all angles. Find the illuminance at the centre above the front edge, explaining each step. 5

(b) Compare Spherical and Cylindrical Illuminance with suitable diagrams and explain them . 4

(c) Mention any eight important places in your Department , where emergency lamps should be fitted. 2

4. Describe with necessary diagram, any two:

(a) Parallel Plane Aspect Factor. 4

(b) Battery powered transistorized inverter system to be used for Non-Maintained Emergency Lighting. 4

(c) Any of the three guidelines for the selection of Flood Lighting Equipment. 3

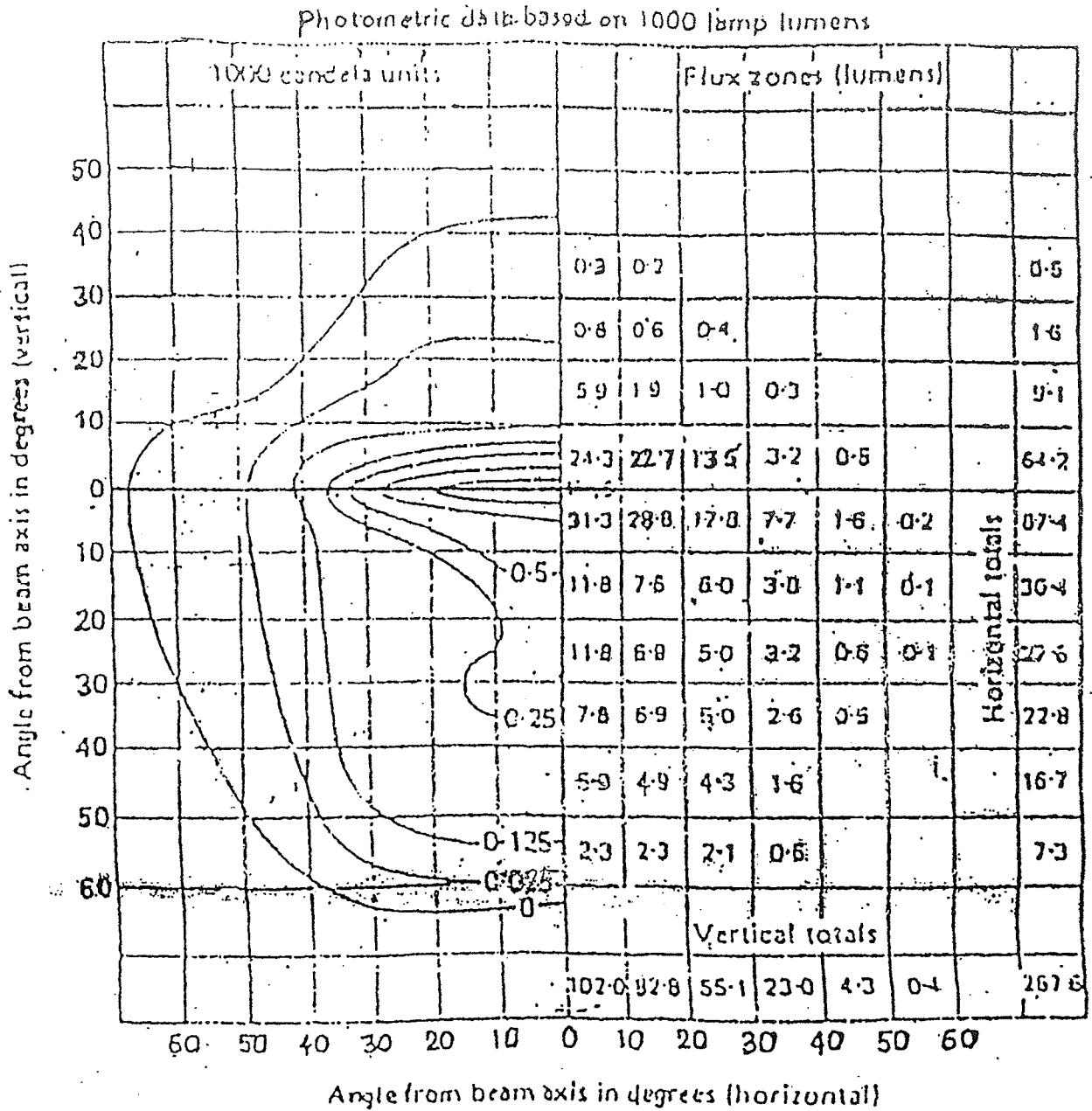


Fig. 1 Zonal flux and isocandela diagrams for floodlighting.

**B.E.ELECTRICAL ENGG. Examination 2022**

**[4<sup>th</sup> Year; 2<sup>nd</sup> Semester]**

**Subject: ADVANCED LIGHTING CALCULATION AND DESIGN**

Time: 3 hours

Use Separate Answer script for each part

Full Marks: 70  
(35 marks for each Part)

Part-II

ANSWER ALL QUESTIONS

Q.1.

- A) What are the advantages and challenges of daylight integrated artificial lighting system?
- B) Write down the procedure of measurement of diffuse daylight efficacy and global daylight efficacy.
- C) Write down the mathematical expressions of Daylight Coefficient and state how it differs from the Daylight Factor as daylight prediction tool.
- D) The U-factor, SHGC and VLT are considered as essential selection parameters of a glazing system – explain.

3+4+4+4=15

**OR**

Q.1.

- A) Derive the mathematical expression of point-specific horizontal illuminance due to unobstructed sky from basic law of illuminance.
- B) Describe (i) physical principle, (ii) characteristics and (iii) applications of any one from the following daylighting systems –  
(I) Louvers and blind system; (II) Light guiding shades.

7+8=15

**OR**

Q.1.

- A) Write down the CIE SSLD model and explain its applicability with suitable diagram.
- B) Briefly discuss on the conceptual design metrics of daylighting design.

7+8=15

Q.2.

- A) What are the major objectives of roadlighting design?
- B) Write down the thumb rules of pole layout with suitable diagram.
- C) Briefly discuss the luminance based design parameters of roadlighting design.

4+4+7=15

**OR**

Q.2.

- A) What is luminance coefficient? Write down, in step, the computational procedure of average road surface luminance within a span of a road surface for single-sided pole installation.
- B) State the assessment procedure of threshold increment in connection to roadlighting design and explain how the threshold increment is considered as a measure of disability glare.

8+7=15

Q.3.

- A) Explain the pay back method in connection to a lighting installation.
- B) Write down the components of capital cost and running cost of lighting installation

3+2=5