BACHELOR OF ELECTRICAL ENGG. EXAMINATION, 2017
(4th Year, 2nd Semester)

ELECTIVE-II ADVANCED LIGHTING DESIGN

Time : Three hours **Full Marks : 100**

(50 marks for each part)

Use separate Answer-script for each part

PART – I

Answer Any Two Questions from Q1, Q2 and Q3

1.Write short notes on (any four) 4x4=16

(a)The method of Illuminance calculation from an Area source.

(b) American Standard [NEMA] classification system for Floodlights

(c) Classification of Flood-Lights as per Indian Standard [IS13383 (Part3):1992]

(d)Power source used for Emergency system

(e) Floating and Maintained type Emergency Lighting

2.Describe the following: 4+8+4=16

(a) Merits & Demerits of using High Frequency Inverter based Lighting system in Transport and Emergency system.

(b) For a Uniform linear diffuser, $I(\alpha) = I(0).\cos\alpha$, find the value of Parallel Plane and Perpendicular plane Aspect Factors respectively in details with necessary diagrams .

(c) One half peak divergence and Half-peak side angle .

3.(a)A tube light is mounted direct above the front-edge of a work bench of 0.8 m width. Both are 1.6 m long and the mounting height is 2.8 m. The transverse intensity is 500 cd at all angles. Find the illuminance at the centre above the front edge. 7

(b)Describe Motor–Generator set driven Emergency Lighting system. 5

(c)Write down any of the four guidelines for the selection of Flood Lighting Equipment. 4

Answer Any One Question from Q4 and Q5

4.(a) Show the schematic Block Diagram of a solar powered non-maintained emergency Lighting system. Draw any one inverter circuit diagram which can be used in this system and explain its operation. 6

(b) Write down the thumb rules for the selection of High Masts for Flood Lighting a big open area . 3

(c) A square area, each side of 44m length, is illuminated by placing one pole at the middle of each of the four perimeters of the area. The poles are of 16 m height and each one carries 2x400W 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

Given: the total initial lamp lumen = 48.5Klm, the depreciation factor = 0.8, the maintenance factor = 0.65, the atmospheric loss factor = 0.85.

Photocopy of Fig.1 is attached,submit the diagram if used. 9

5. (a) Find out the Illuminance from a circular shaped diffused source of 2.5 ft diameter (having luminance L),at a point vertically 6ft.below. If the source diameter is doubled, three times and four times, what will be the illuminance values at that point? Drawing a graph, show the variation. 6

(b) A square area, each side of 34 m length, is illuminated by placing one pole at the middle of each of the four perimeters of the area. The poles are of 15 m height and each one carries 2x400W SON floodlights. Using the given diagram of Fig. 1, and showing each step clearly, find out the following:

i) the average horizontal illuminance on the area,

ii) the summation of the illuminances at the corners of the area.

Given: the total initial lamp lumen = 48.5 Klm, the depreciation factor = 0.8, the maintenance factor = 0.8, the atmospheric loss factor = 0.75. Photocopy of Fig.1 is attached , submit the diagram if used. 12

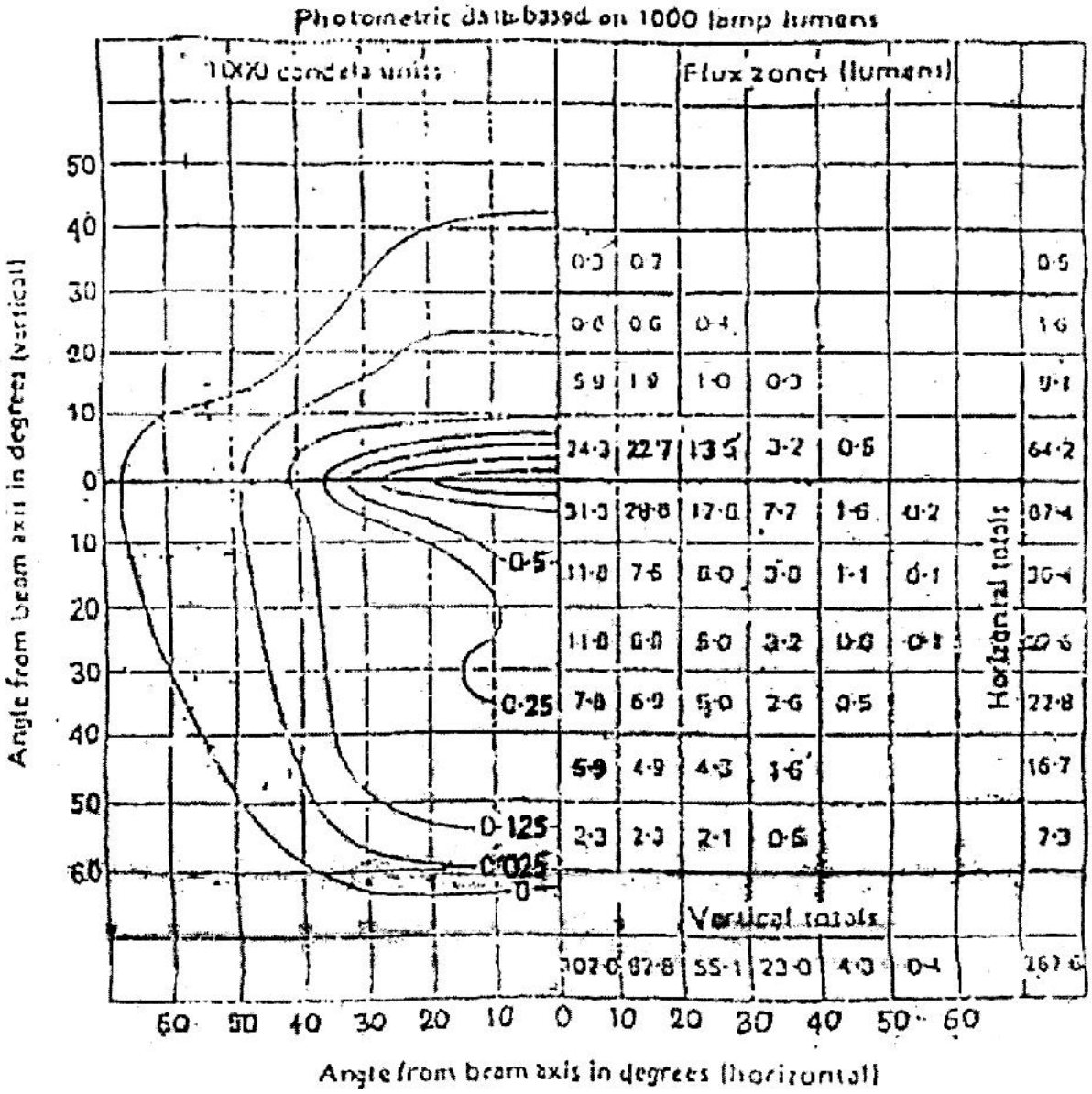

Fig. 1 Zonal flux and isocandela diagrams for floodlighting.

[Turn over

Ref.No. EX/EE/T/423F/2017(Old)

B.E.ELECTRICAL ENGG. Examination 2017 (OLD)
[4th Year; 2nd 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 roadlighting design parameters according to IS:1944 and discuss these parameters are measured in practice.

B) Draw typical relative iso-lux diagram of a roadlight luminaire and describe the method of point-specific illuminance computation on a road surface using that diagram for a single sided pole layout.

(10+8=18)

Q.2.

A) Discuss on roadlighting installation geometry with suitable diagram and the thumb rules for selection of pole lay out.

B) Define Unit Power Density. How UPD is estimated for different pole layout?

C) Explain the parameter 'Threshold Increment' related to roadlighting design.

(8+4+4=16)

Q.3.

A) Discuss, in detail, the steps of measurement of (i) Global Luminous Efficacy and (ii) Diffuse luminous Efficacy of available solar radiation on earth surface.

B) Derive the expression of point- specific horizontal illuminance of entire sky vault and find out the expression of it for the following sky luminance distribution-

$$L_\gamma = \frac{L_z}{3} * [1 + 2 * \mathrm{Sin}(\gamma)]$$ (symbols have their usual meaning)

(6+10=16)

Q.4.

A) Define Daylight Factor (DF) and Daylight Coefficient (DC). Mention the components of DF.

B) Compare between DF method and DC method used for the prediction of daylight availability inside an interior space.

C) What the advantages and limitations of daylight integrated artificial lighting system.

(6+6+4=16)

Q5.

A) Discuss on suitable retrofit lighting solutions for a typical commercial indoor lighting system with respect to (i) light source and (ii) ballast and control gear.

B) Discuss on the components of (i) Capital cost and (ii) Running cost of a lighting system. How these data are utilized for the cost-benefit analysis between two lighting design alternatives?

C) What do you understand by energy efficient lighting system? Give example.

(6+6+4=16)