B.E. ELECTRICAL ENGINEERING FOURTH YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023
ADVANCED LIGHTING CALCULATION AND DESIGN

Time : Three hours   Full Marks : 100

(50 marks for each part)

Use separate Answer-script for each part

PART – I

Q 1 is COMPULSORY

1. A rectangular area of 70m x 54m side is illuminated by placing two poles at one of the longer sides of the area, keeping 30m. space between them . The poles are of 20m height and each of them carries 8x400W SON floodlights. Each pole is located 2.6 m outside the boundary line of the area. Using the Zonal flux diagram , and showing each step clearly, find out the followings: [Given: the total initial lamp lumen = 48.5 Klm, the depreciation factor = 0.8, the maintenance factor = 0.65, the atmospheric loss factor = 0.85]
   i)   the Utilization Factor
   ii) the average horizontal illuminance on the area
   iii) if 25%, 50% and 75% of the lamps are made OFF, what illuminances will you get?
   iv) how will you save power from 5pm to 5am switching the lamps properly ?
   v)   find out the points where minimum   illuminance will be obtained.
   [Given: the total initial lamp lumen = 48.5 Klm, the depreciation factor = 0.8, the maintenance factor = 0.7, the ospheric loss factor = 0.9]

   Photocopy of Fig.1 is attached, submit the diagram if used.   20

Answer Any TWO from rest of the Questions.

2. (a) Explain the method of Illuminance calculation from a circular shaped diffused source of 4 ft diameter at a point vertically 8.5 ft.below.If the source diameter is made doubled, four times, eight times what will be the illuminance values at that point?
   Draw a graph, showing the variations.   8

   (b) Compare the   Classification system of of Flood-Lights as per Indian Standard [IS13383 (Part3):1992] And American standard.   7

3. (a) Describe Motor –Generator Set driven Emergency Lighting system   6

   (b) Show a proposed schematic Block Diagram of a solar powered non-maintained emergency Lighting system at your home , where emergency lamps are required.   5
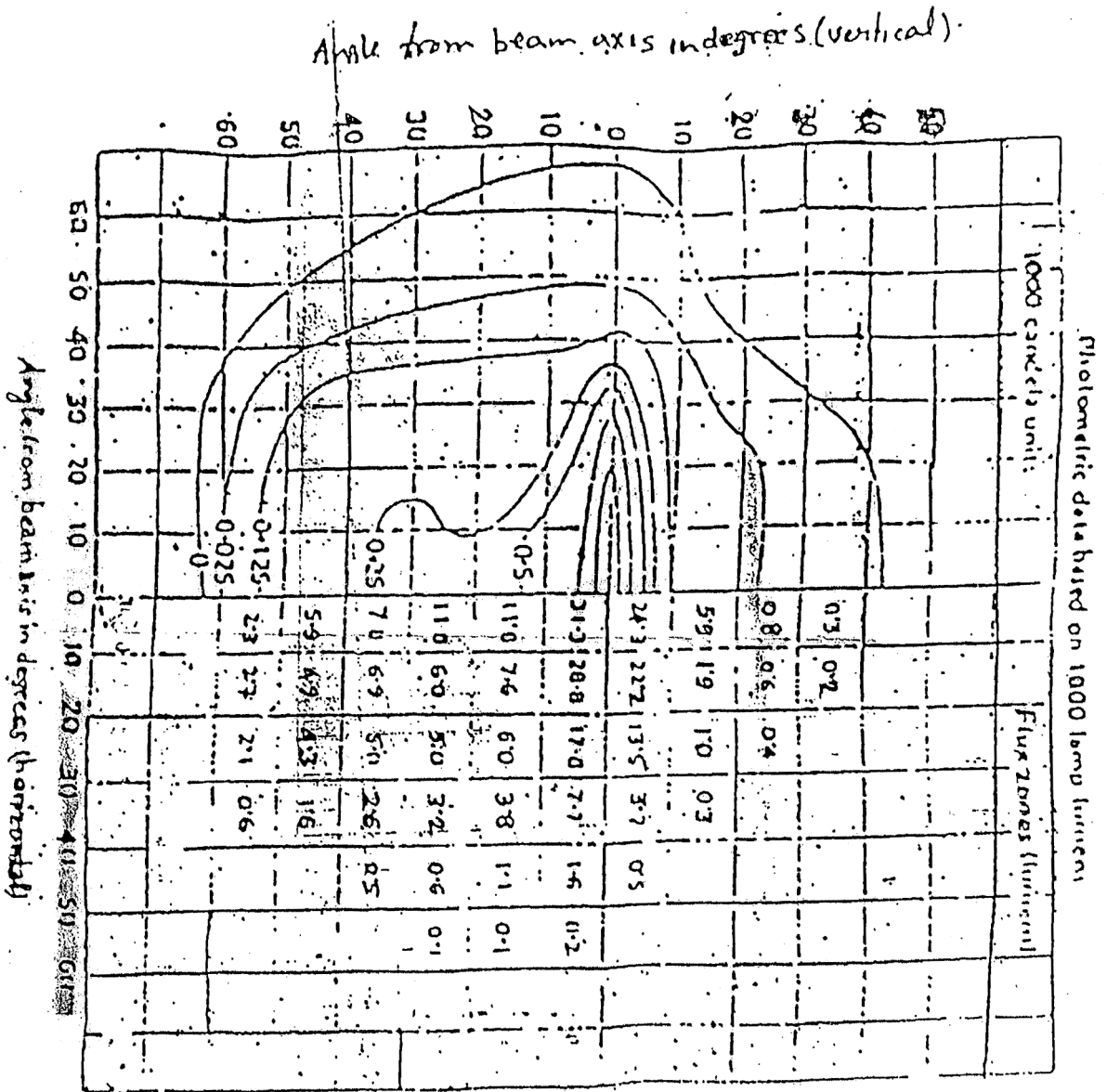
   (c) Write down any of the four guidelines for the selection of Flood Lighting Equipment.   4

[Turn over

4. (a) Explain Merits & Demerits of using High Frequency Inverters in Emergency Lighting system.   4

(b) Explain the method of illuminance calculation at a point from a Triangular diffused source and Explain using this, how would you find out the illuminance at a point from a diffused rectangular ceiling surface area and a rectangular wall surface area.   5+3+3= 11

Angle from beam axis in degrees (vertical).

Photometric data based on 1000 lamp lumens.

1000 candela unit.

Flux zones (lumens).

Angle from beam axis in degrees (horizontal).

[4   ]

B.E.Electrical Engg. Supplementary Examination 2023
[4th Year; 2nd Semester]
Subject: Advanced Lighting Calculation and Design
Part-II

Time: 3 hours   Use Separate Answer script for each part   Full Marks:100

(50 marks for each Part)

[Answer ALL Questions]

Q.1.	Explain and justify the following statements with suitable example- i) Sensor-based automated artificial lighting system is to be integrated with daylighting system. ii) Daylight Factor (DF) is applicable only for overcast sky condition whereas Daylight coefficient (DC) method is applicable for all types of sky condition; iii) Only on-site evaluation of roadlighting installation is done by nine-point method. iv) Longitudinal uniformity is a design parameter only applicable in case of roadlighting design.	10 [CO1]
Q.2.	Describe the illuminance based design parameters for a streetlighting installation.	10 [CO2]
Q.3	Derive the mathematical expression of point-specific horizontal illuminance due to an unobstructed sky vault from basic definition of illuminance.	10 [CO3]
Q.4.	What do you understand by the capital cost and running cost of a lighting installation? Explain payback period method. How this method is applied to compare cost-benefit analysis of any lighting design scheme?	10 [CO4]
Q.5.	Compare between the two daylighting schemes with suitable examples - top-lighting and side-lighting.	10 [CO5]

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