

17639

16172

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. (A) Attempt any THREE : 12

- (a) State any four requirements of good illumination scheme.
- (b) Write any four advantages of halogen lamps.
- (c) State the purpose of lighting control equipments.
- (d) Draw a neat diagram of resistance dimmer circuit and explain in brief its working.

(B) Attempt any ONE : 6

- (a) Compare sodium vapour lamp and mercury vapour lamp on the following aspects (i) Working principle (ii) Life in Hours (iii) Starting time (iv) Lumens per watt (v) Initial cost (vi) Brightness
- (b) Define (i) Mean spherical candle power (ii) Luminous efficiency (iii) Space to height ratio

2. Attempt any TWO :**16**

- (a) Explain both the types of Dimmer transformer in detail for illumination control drawing the necessary figures.
- (b) Estimate the number and wattage of lamps which would be required to illuminate a workshop spaced 60×15 m by means of lamps mounted 6 m above the working plane. The average illumination required is about 100 lux, coefficient of utilization is 0.4, luminous efficiency is 16 lumens per watt. Assume a space-height ratio of unity and a candle power depreciation of 20%.
- (c) The front of a building $50 \text{ m} \times 16 \text{ m}$ is illuminated by 16 nos. of 1000 watts lamps arranged so that uniform illumination on the surface is obtained. Assume :
1. Luminous efficiency = 17.4 lumens/watt.
 2. Utilization factor = 0.4
 3. Depreciation factor = 1.3
 4. Waste light factor = 1.2

Determine the illumination on the surface.

3. Attempt any FOUR :**16**

- (a) State any four basic requirements of street lighting.
- (b) State any four benefits of good industrial lighting.
- (c) Find (i) MSCP (ii) Luminous intensity in lumens per watt (iii) MSCP per watt of a 250 volts lamp which takes a current of 0.4 amp and has a total flux of 1500 lumens.
- (d) Explain the construction and working of sodium vapour lamp with a neat sketch.
- (e) Describe the working principle and construction of thyristor operated dimmer with diagram.

4. (A) Attempt any THREE :

12

- (a) Write the recommended level of illumination in lux for the following areas of an office (i) Entrance halls and reception area (ii) Conference room (iii) Stairs (iv) Lift landing
- (b) A room of size 15×6 m is to be illuminated by twenty 200 W lamps. The MSCP of each lamp is 250. Assume a depreciation factor 1.2 and utilization factor 0.6 Find the average illumination produced on the floor.
- (c) Which type of lamp is used for fresh water aquarium and why ?
- (d) Explain direct and semi-direct lighting with the required sketches.

(B) Attempt any ONE :

6

- (a) An illumination on the working plane of 75 Lux is required in a room $72 \text{ m} \times 15 \text{ m}$ in size. The lamps are required to be hung 4 m above the work bench. Assume a suitable space-height ratio, a utilization factor of 0.5, a lamp efficiency of 14 lumens per watt and a candle power depreciation of 20%, estimate the number, rating and disposition of lamps.
- (b) Which type of light source is used for following application :
 - (i) Advertisement (ii) Flood lighting (iii) Street lighting (iv) Decorative lighting (v) Hospital (vi) Railway platform lighting

P.T.O.

5. Attempt any TWO :**16**

- (a) A minimum illumination of 80 lumens/m² is required in the factory shade of 50 m × 12 m. Calculate the number, location and wattage of the units used. Assume that depreciation factor 0.8, coefficient of utilization is 0.4 and efficiency of lamp units is 14 lumens/watt.
- (b) What are the various arrangements of locating lamps for lighting for advertisements hoarding ? Draw the basic circuitry and explain in detail.
- (c) Describe in detail the lighting schemes used for aquariums and shipyards.

6. Attempt any FOUR :**16**

- (a) A room of size 20 m × 5 m is illuminated by 20 number of 200 watt lamps. The MSCP of each lamp = 250. Assume utilization factor = 0.6 and depreciation factor = 1.2. Find average illumination produced on the floor. State and explain the features of railway platform lighting.
- (b) What is meant of flood lighting ? Define the terms : (i) beam factor (ii) waste light factor related to flood lighting.
- (c) A hall 30 × 12 m is to be illuminated with 50 m candles, DF = 1.3 and UF = 0.5. Calculate space to height ratio and work out the number of lamps from the following table and select suitable wattage lamp for uniform light disposition.

Watts	100	200	300	500	1000
Lumens	1615	3650	4700	9950	21500

- (d) State the general requirements and lighting scheme adopted for hospitals and health care buildings.
- (e) Discuss the different factors on which the aquarium lighting design depends.
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