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21415

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.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(8) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. (A) Attempt any THREE :

12

(a) Define each of the following terms of illumination :

lux, lumen, luminous flux, illumination

(b) State any four difference between tungsten filament bulb and fluorescent tube light.

(c) Explain difference between dimming control & on/off control in lighting control.

(d) State any six factors on which efficiency of lighting depends.

(B) Attempt any ONE :

6

(a) Explain with neat sketch construction and working of High Pressure Mercury Vapour Lamp.

(b) Define each of the following terms of illumination :

Maintenance factor, Absorption factor, Utilization factor.

P.T.O.

2. Attempt any TWO :**16**

- (a) Draw and explain how one lamp can be controlled by two switches.
- (b) A uniform illumination of 50 lux is to be obtained on the floor of a room measuring $10\text{ m} \times 10\text{ m}$ by arranging electric light suitably. Calculate the number of lamps and watt rating of each lamp if the efficiency of lamp is 15 lumens/watt. Assume and write suitable values required in this calculation.
- (c) A room of $20\text{ m} \times 10\text{ m}$ is illuminated by 20 numbers of 200 W lamps. The MSCP of each lamp is 240. If utilization factor is 0.65 and depreciation factor 1.25 then find average illumination produced on the floor.

3. Attempt any FOUR :**16**

- (a) State any four characteristics of factory lighting.
- (b) State illumination in Lux for each of the following :
operation theatre, stair, living room, study room
- (c) A 230 V lamp has a total flux of 2500 lumens and takes a current of 0.7 amp. Calculate lumens per watt and MSCP per watt.
- (d) Explain with diagram construction and working of CFL lamp.
- (e) Explain working of salt water dimmer with the help of diagram.

4. (A) Attempt any THREE :**12**

- (a) Explain difference between uniform lighting and localised lighting.
(any four)
- (b) State any four specific requirements of flood lighting.

- (c) State any four applications of decorative lighting.
- (d) Explain any four differences between direct lighting and indirect lighting.

(B) Attempt any ONE :

6

- (a) Explain with neat diagram, construction and working of fluorescent tube light.
- (b) Explain lumens or light flux method for calculation of light.

5. Attempt any TWO :

16

- (a) Estimate the number and wattage of lamps which is required to illuminate a workshop space $70 \text{ m} \times 20 \text{ m}$ by means of lamps mounted 5.5 m above the working plane. The average illumination required is 90 lux , coefficient of utilization is 0.45 , luminous efficiency $18 \text{ lumens per watt}$. Assume a space height ratio of unity and maintenance factor 0.85 .
- (b) A floor lighting is to be provided on the front of a building of $40 \text{ m} \times 25 \text{ m}$ for brightness of $18 \text{ lumens/square meter}$. The coefficient of reflection of building surface is 0.21 . The lamps of 500 W having lumen output 8400 each are used. If beam factor is 0.65 , waste light factor is 1.1 , maintenance factor 0.85 then calculate number of lamps for flood lighting.
- (c) Explain how lighting scheme should be designed for each of the following operation theatre in hospital, general ward in hospital.

6. Attempt any FOUR :

16

- (a) A hall of $80 \text{ m} \times 40 \text{ m}$ with a ceiling height of 5.2 m is to be provided with a general illumination of 150 lumens/sq.m . Assuming coefficient of utilisation of 0.6 and depreciation factor of 1.35 , determine the number of fluorescent tubes required, the distance between them, mounting height, total wattage. The luminous efficiency of fluorescent tube is $35 \text{ lumens per watt}$ for 40 watt tube light.

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- (b) A 0.5 meter diameter diffusing sphere of opal glass (25% absorption) encloses a lamp with luminous flux of 4800 lumens. Calculate average luminance of the sphere.
 - (c) State any four requirements of illumination of sports lighting.
 - (d) State any four effects that can be obtained by lighting on stages.
 - (e) State any four desirable characteristics of lighting required in aquarium.
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