



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/B.OPTM/SEM-3/BO-302/2011-12**

**2011**

**LIGHTING & THE EYE**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP - A  
( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) Incandescent lamp has
  - a) asymmetrical polar curve
  - b) symmetrical polar curve
  - c) both (a) and (b)
  - d) none of these.
- ii) Lux meter comprises
  - a) photodiode
  - b) photomultiplier tube
  - c) photovoltaic cell
  - d) either (a) or (b).
- iii) Light meter measures
  - a) intensity of illumination
  - b) luminance
  - c) luminous intensity
  - d) luminous flux.

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- iv) The unit of solid angle is
- a) solid angle                      b) radian
- c) steradian                        d) candela.
- v) Which photometer is used for comparing the lights of different colours ?
- a) Bunsen photometer
- b) Grease spot photometer
- c) Lummer Brodhum photometer
- d) Guilds Flicker photometer.
- vi) One lumen per square metre is the same as
- a) one lux                            b) one candela
- c) one foot candle                d) one lumen metre.
- vii) Which of the following lamps gives nearly monochromatic light ?
- a) Sodium vapour lamp    b) GLS lamp
- c) Tubelight                        d) Mercury vapour lamp.
- viii) Lumen/watt is the unit of
- a) Light flux                        b) Luminous intensity
- c) Brightness                        d) Luminous efficiency.
- ix) A mercury vapour lamp gives
- a) pink light                        b) yellow light
- c) greenish blue light        d) white light.
- x) In gas filled filament bulbs, the gas used is
- a) oxygen                            b) helium
- c) nitrogen                         d) ozone.

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xi) The mathematical expression of illuminance is

- a)  $\frac{\phi}{A}$
- b)  $\frac{\phi}{W}$
- c)  $\frac{I}{A}$
- d)  $\frac{\phi}{L}$ .

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Give a brief description of Photodiode.
3. Obtain the relation between lumen and watt.
4. Write a brief description of the various components of an incandescent lamp with the help of a labelled diagram.
5. Write on CIE standard observer briefly.

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

6. a) Define luminance and luminous emittance with their SI units.
- b) Write down the construction and working of photovoltaic cell.
- c) A point source of light of 100 cd is placed inside the sphere of diameter 0.5 m. The material of the sphere has 25% absorptance. Find luminous emittance and luminance.  $4 + 8 + 3$
7. a) Compare between incandescent and discharge lamps.
- b) Write the properties of a good filament material.
- c) How does discharge lamp generate light energy ?
- d) Discuss daylight factors.  $3 + 3 + 4 + 5$

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8. Discuss luminaries and their design. Explain the concept of "lighting system management" and your reasons for choice of lighting equipment.

9. a) What is a Lambertian surface ?

b) For a flat perfect diffuser derive the following relations :

i)  $\phi = \pi \times I N$

ii)  $M = \pi \times L$

iii)  $L = \frac{P \times E}{\pi}$

where these symbols have their own meaning.

c) What is the meaning of I.P. Code ? Explain why it is important for indoor luminaire selection. 1 + 10 + 4

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