Name :	A
Roll No. :	Charlenne (y'Xanutalip Staf Exclared
Invigilator's Signature :	

CS/B. OPTM/SEM-3/BO-302/2009-10 2009 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 of the following : $10 \times 1 = 10$

- i) At room temperature a blackbody appears as
 - a) red b) blue
 - c) black d) yellowish-white.
- ii) 'Nits' is the unit of
 - a) Luminous flux
 - b) Luminous intensity
 - c) Luminance
 - d) Illumination.

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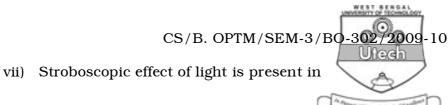
- iii) To describe the colour of daylight
 - a) CT is used
 - b) CCT is used
 - c) CRI is used
 - d) daylight factors is used.
- iv) Flicker photometer can work when two sources are
 - a) monochromatic
 - b) emitting the same wavelength
 - c) emitting different wavelength
 - d) both (a) & (b).
- v) Photopic vision is
 - a) dim light vision
 - b) bright light vision
 - c) both of these
 - d) none of these.
- vi) The harmful effect of glare can be reduced in practice by
 - a) placing opaque shield in front of the source
 - b) using diffusing enclosure
 - c) increasing the background illumination level

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d) all of these.

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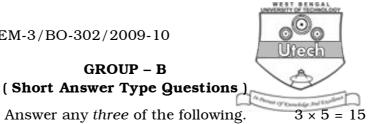


- a) discharge lamp
- b) incandescent lamp
- c) halogen lamp
- d) none of these.
- viii) The photometer based on visual photometry is
 - a) photovolatic cell
 - b) photoconductor cell
 - c) guild flicker photometer
 - d) junction photodiode.
- ix) To which wavelength our eye is most sensitive ?
 - a) 380 nm b) 550 nm
 - c) 632 nm d) 1064 nm.
- x) For a perfect diffuser
 - a) luminous flux
 - b) luminous intensity
 - c) illumination
 - d) luminance.

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2.What is CIE ? a)

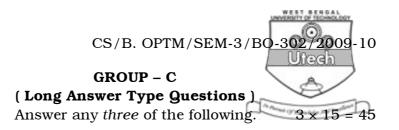
> What do you mean by CIE standard observer ? b)

GROUP – B

- Draw the $V_{\lambda} \lambda$ curve of a standard observer. 1 + 2 + 2c)
- Draw and explain the polar diagram of an incandescent 3. 5 lamp.
- 4. Define luminous intensity and its unit candela. a)
 - What source is currently being used as a standard b) 4 + 1 source?
- 5. How can you define standard of a lamp? a)
 - Define luminous efficacy of a lamp. b)
 - What is the maximum efficacy that can be achieved in a c) General Service Lamp (GSL)? 2 + 2 + 1
- 6. Draw spectral luminous efficiency curve of human eye. a)
 - 2 + 3b) Explain the basic principle of a photodiode.
- $2 \times 2\frac{1}{2}$ 7. Distinguish between the following :

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- Photopic and Scotopic vision a)
- Visual and physical photometry. b)
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- 8. a) Briefly discuss the construction and working principle of the LB-photometer.
 - b) Write down the conditions to be maintained to operate a flicker photometer correctly.
 - c) Two sources are situated at 60 cm and 40 cm distances from a Bunsen grease photometer when the illumination due to two lamps over the grease spot appears same. Then the intense source is covered and intensity reduced to 80% of the initial intensity. At what distance should the intense bulb be placed to get back the initial condition again. 6 + 4 + 5
- 9. a) Prove that for a perfect Lamertian surface $\phi = \pi L$, where the symbols have their own significance.
 - b) What do you mean by colour correction and cosine correction of a photocell ?

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c) The illumination required inside a room 20 m \times 18 m is 100 lux. Find out the no. of co-efficient of utilization = 0.75.

maintenance factor = 0.75

lamp efficacy = 10 lm/watt

power of each lamp = 200 watt. 5 + (3 + 3) + 4

- 10. a) Briefly discuss the four lighting schemes for interior lighting.
 - b) A lighting scheme is required for small 8×8 library room. The height of the ceiling and the working plane are respectively 3 m and 0.8 m. The surface reflectance of the ceiling, the wall, and the floor are 0.7, 0.3, 0.2 respectively. Luminaire to be used has quoted a maximum S/h_m ratio of 1.95. Suggest a general lighting scheme for the room considering the maintenance factor 0.68. 8+7
- 11. a) Distinguish between incandescent lamp and discharge lamp.
 - b) Write down the construction of sodium vapour lamp.
 - c) State different light loss factors.
 - d) Define ULOR and DLOR. 3+4+4+4

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- 12. a) Discuss on LUX meter sensor. Why is colour correction and cosine correction necessary for a LUX meter sensor? 7
 - b) A certain 100 watt light bulb emits a total luminous flux
 of 1200 lumen, distributed uniformly over a
 hemisphere. Calculate the luminance and the luminous
 intensity at a distance of 1 m and at 5 m. 5
 - c) Write down the mathematical relation between lumen and watt for photopic vision.
- 13. Write short notes on any *three* of the following : 3×5

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- a) Photomultiplier
- b) Colourimetry
- c) Isolux diagram
- d) VDU design of work station
- e) Eye protectors.

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