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BINA CHOWDHURY CENTRAL LIBRARY
Jharkhand (JPS)
Azara, Halkiwapara,
Guwahati - 781017

2022

B.Tech. 8th Semester End-Term Examination

EE

ILLUMINATION ENGINEERING

(New Regulation (w.e.f. 2017-18) &
New Syllabus (w.e.f. 2018-19))

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

PART A

Multiple choice questions. Answer All the questions for this part. (10 × 1 = 10)

1. (i) Light wave travel with a velocity of
 - (a) 3×10^{10} cm/s
 - (b) 3×10^{12} cm/s
 - (c) 3×10^{15} cm/s
 - (d) 3×10^{18} cm/s
- (ii) Carbon arc lamps are commonly used in
 - (a) Domestic lighting
 - (b) Street lighting
 - (c) Cinema Projector
 - (d) Photography
- (iii) The unit of solid angle is
 - (a) Solid Angle
 - (b) Radian
 - (c) Steradian
 - (d) Candela

[Turn over

- (iv) The illumination is directly proportional to the cosine of the angle made by the normal to the illuminated surface with the direction of the incident flux. The above statement is associated with
- (a) Planck's law
 - (b) Macbeth's law of illumination
 - (c) Bunsen's law of illumination
 - (d) Lambert's cosine law
- (v) Which of the following will need the highest level of illumination?
- (a) Proofreading
 - (b) Bed Room
 - (c) Hospital wards
 - (d) Railway platforms
- (vi) Which of the following lamps gives nearly monochromatic light?
- (a) Sodium vapor lamp
 - (b) GLS Lamp
 - (c) Tube light
 - (d) Mercury vapor lamp
- (vii) The optical instrument used for the comparison of candle power of different sources are known as
- (a) Candle meters
 - (b) Radiometers
 - (c) Bunsen meter
 - (d) Photometer
- (viii) Light is produced in electric discharge lamps by
- (a) Heating effect of current
 - (b) Magnetic effect of current
 - (c) Ionization in a gas or vapor
 - (d) Carbon electrodes
- (ix) Which gas is sometimes used in filament lamps?
- (a) Argon
 - (b) Krypton
 - (c) Nitrogen
 - (d) Carbon dioxide

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- (x) A 60W lamp given a luminous flux of 1500 lumen. Its efficiency is
- (a) 1500 lumen/watt
 - (b) 250 lumen/watt
 - (c) 25 lumen/watt
 - (d) 2.5 lumen/watt

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PART B

Answer any FOUR question for this part.

(4 × 15 = 60)

2. (a) State and prove the law of Inverse Square. (5)
(b) Derive the relationship between solid angle and plane angle. (5)
(c) In a street lighting scheme, lamps having uniform CP of 800 are hung at a height of 10 m. Distance between consecutive lamp posts is 12m. Find illumination under middle lamp and at the centre in between the lamp posts. (5)
3. (a) Differentiate between eye and camera. (5)
(b) What are the advantages and disadvantages of halogen lamps? (5)
(c) Explain thermal type starter. (5)
4. Define the following terms : (5 × 3 = 15)
(a) Rhodas and cones
(b) Candle power
(c) Reduction factor
(d) Colour rendering
(e) Utilization factor.
5. (a) Explain the working of a sodium vapour discharge lamp with diagram. (5)
(b) Explain the working of a Bunsen Grease type spot photometer. (5)
(c) It is desired to illuminate a drawing hall with an average illumination of about 250 lux. The area of the hall is (25×30)m². The lamps are to be fitted at 5m height. Find out the number and size of incandescent lamps required for an efficiency of 12 lumens/watt. UF = 0.4, MF = 0.85. (5)

6. (a) Describe the different types of lighting schemes. (10)
- (b) A lamp of 200 CP is placed 1m below a plane mirror which reflects 85% of light falling on it. The lamp is hung 5m above the ground. Find the illumination at a point on the ground 4m away from the point vertically below the lamp. (5)
7. (a) Differentiate between luminosity and apparent brightness. (5)
- (b) State the guidelines adapted for residential lighting. (5)
- (c) What is the necessity of choke in a discharge lamp? (5)

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