



Maratha Vidya Prasarak Samaj's

**Rajarshi Shahu Maharaj Polytechnic, Nashik**

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY

Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

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*Subject : ILLUMINATION AND ELECTRIFICATION  
OF BUILDING  
(22530)*



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# SYLLABUS

<b>Chapter No.</b>	<b>Name of chapter</b>	<b>Marks With Option</b>
<b>1</b>	Fundamental of illumination	<b>14</b>
<b>2</b>	Types of Lamps	<b>24</b>
<b>3</b>	Illumination control and control circuits	<b>24</b>
<b>4</b>	Illumination for interior application	<b>20</b>
<b>5</b>	Lighting for outdoor and special application	<b>20</b>
<b>Total Marks :-</b>		<b>102</b>



## **BOARD THEORY PAPER PATTERN FOR ALL BRANCHES**

<b>Q.1</b>		<b>Attempt any FIVE</b>	<b>5*2=10</b>
	a)	Fundamental of illumination	
	b)	Types of Lamps	
	c)	Types of Lamps	
	d)	Illumination control and control circuits	
	e)	Illumination control and control circuits	
	f)	Illumination for interior application	
	g)	Lighting for outdoor and special application	
<b>Q.2</b>		<b>Attempt any THREE</b>	<b>3*4=12</b>
	a)	Fundamental of illumination	
	b)	Types of Lamps	
	c)	Types of Lamps	
	d)	Lighting for outdoor and special application	
<b>Q.3</b>		<b>Attempt any THREE</b>	<b>3*4=12</b>
	a)	Fundamental of illumination	
	b)	Types of Lamps	
	c)	Illumination control and control circuits	
	d)	Illumination for interior application	
<b>Q.4</b>		<b>Attempt any FOUR</b>	<b>3*4=12</b>
	a)	Fundamental of illumination	
	b)	Illumination control and control circuits	
	c)	Illumination for interior application	
	d)	Lighting for outdoor and special application	
	e)	Lighting for outdoor and special application	



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<b>Q.5</b>		<b>Attempt any TWO</b>	<b>2*6=12</b>
	<b>a)</b>	Fundamental of illumination	
	<b>b)</b>	Types of Lamps	
	<b>c)</b>	Illumination control and control circuits	
<b>Q.6</b>		<b>Attempt any FOUR</b>	<b>2*6=12</b>
	<b>a)</b>	Types of Lamps	
	<b>b)</b>	Illumination control and control circuits	
	<b>c)</b>	Lighting for outdoor and special application	

# CLASS TEST - I

## PAPER PATTERN

### Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
1	Fundamental of illumination	CO.530.1
2	Types of Lamps	CO.530.2

Q.1	Attempt any FOUR	4*2=8Marks	Course Outcome (CO)
a)	Types of Lamps		CO.530.2
b)	Fundamental of illumination		CO.530.1
c)	Types of Lamps		CO.530.2
d)	Fundamental of illumination		CO.530.1
e)	Fundamental of illumination		CO.530.1
Q.2	Attempt any THREE	3*4=12 Marks	
a)	Fundamental of illumination		CO.530.1
b)	Types of Lamps		CO.530.2
c)	Types of Lamps		CO.530.2
d)	Types of Lamps		CO.530.2
e)	Fundamental of illumination		CO.530.1

# CLASS TEST - II

## PAPER PATTERN

### Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
3	Illumination control and control circuits	CO.530.3
4	Illumination for interior application	CO.530.4
5	Lighting for outdoor and special application	CO.530.5

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	Illumination control and control circuits	CO.530.3
b)	Illumination for interior application	CO.530.4
c)	Illumination for interior application	CO.530.4
d)	Lighting for outdoor and special application	CO.530.5
e)	Lighting for outdoor and special application	CO.530.5
Q.2	Attempt any THREE 3*4=12 Marks	
a)	Illumination control and control circuits	CO.530.3
b)	Illumination for interior application	CO.530.4
c)	Lighting for outdoor and special application	CO.530.5
d)	Illumination for interior application	CO.530.4



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# COURSE OUTCOME (CO)

**COURSE: - Illumination and Electrification of Building (22530)**

**PROGRAMME: - ALL**

<b>CO.NO</b>	<b>Course Outcome</b>
<b>CO-530.1</b>	Select the relevant illumination level for various applications
<b>CO-530.2</b>	Select relevant lamps for various applications
<b>CO-530.3</b>	Design a control circuit for illumination
<b>CO-530.4</b>	Design illumination schemes for various applications
<b>CO-530.5</b>	Interpret the illumination scheme for various purpose



# 1. Fundamental of illumination

Position in Question Paper

Total Marks-14

Q.1. a) 2-Marks.

Q.1. b) 2-Marks.

Q.2. a) 4-Marks.

Q.4. a) 6-Marks.

## Descriptive Question

1. Define following terms:

- |                       |                 |
|-----------------------|-----------------|
| a) Lumen              | d) Plane angle  |
| b) Luminous intensity | e) Illumination |
| c) Candle power       | f) MSCP.        |

2. State and explain lamberts cosine and inverse square law.

3. Ex. Determine the mscp of lamp emitting 1000 lumens . A surface inclined at an angle of  $60^\circ$  to the rays is kept 5 meters away from a 100 Cp lamp . Find the average of illumination on the surface.

4. State features of good illumination scheme (any 8).

5. State advantages of good illumination scheme.

6. Ex. A room of  $30\text{ m} \times 10\text{ m}$  is illuminated by 20 numbers of 200w lamps . The mscp of each lamp 250. If utilization factor is 0.4 and depreciation factor 1.2 then find average illumination produced on the surface.

7. A minimum illumination of  $80\text{ lux/m}^2$  is required in factory shade  $80\text{ m} \times 20\text{ m}$ . Calculate no. of location and wattage of units to be assume that depreciation factor 0.8 , coefficient of utilization is 0.6 and efficiency lamp unit is 14 lumen /watt.

8. An engineering institute's drawing hall 30 meters by 15 meters with a ceiling height of 5 meters is to be provided with a general illumination of 120 lux taking a coefficient of utilization of 0.5 and depreciation factor of 0.4, determine the number of fluorescent tubes required, their spacing mounting height and total wattage. Taking luminous efficiency of fluorescent tube is 35 lumens per watt for 40 watt tube light.

9. State the meaning of polar curves and give two application of it.

10. Explain lumens or light flux methods for calculation of light.





## MCQ Question

(Total number of Question=Marks\*3=14\*3=42)

Note: Correct answer is marked with **bold**.

- Radiant efficiency of the luminous source depends on
  - shape of the source
  - temperature of the source**
  - wavelength of light rays
  - all of the above
- Light waves travel with a velocity of
  - $3 \times 10^{10}$  cm/s**
  - $3 \times 10^{12}$  cm/s
  - $3 \times 10^{15}$  cm/s
  - $3 \times 10^{18}$  cm/s
- Carbon arc lamps are commonly used in
  - domestic lighting
  - street lighting
  - cinema projectors**
  - photography.
- The unit of solid angle is
  - solid angle
  - radian**
  - steradian
  - candela.
- Candela is the unit of
  - Luminous flux
  - Luminous intensity**
  - Wavelength
  - None of the above.
- The unit of luminous flux is
  - steradian
  - candela
  - lumen**
  - lux.
- 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. Above statement is associated with
  - Planck's law
  - Macbeth's law of illumination
  - Bunsen's law of illumination
  - Lambert's cosine law.**
- Illumination level required for precision work is around
  - 50 lm/m<sup>2</sup>
  - 100 lm/m<sup>2</sup>
  - 200 lm/m<sup>2</sup>
  - 500 lm/m<sup>2</sup>.**
- Which of the following will need the highest level of illumination ?
  - Proof reading**
  - Bed rooms
  - Hospital wards
  - Railway platforms.
- Which of the following will need lowest level of illumination ?

- (A) Displays  
 (B) Fine engraving
11. Which of the following lamp gives nearly monochromatic light ?  
 (A) **Sodium vapor lamp**  
 (B) GLS lamp
12. The illumination level in houses is in the range  
 (A) 10-20 lumen/m<sup>2</sup>  
 (B) 30 - 50 lumen/m<sup>2</sup>  
 (C) 40-75 lumen/m<sup>2</sup>  
 (D) **100-140 lumen/m<sup>2</sup>.**
13. Luminous efficiency of a fluorescent tube is  
 (A) 5- 10 lumens/watt  
 (B) 15-20 lumens/watt  
 (C) 30 - 40 lumens/watt  
 (D) **60 - 65 lumens/watt**
14. One lumen per square meter is the same as  
 (A) **One lux**  
 (B) One candela  
 (C) One foot candle  
 (D) One lumen meter.
15. Standard wattage of 3 ft. fluorescent tube is  
 (A) 10 W  
 (B) **40 W**  
 (C) 65 W  
 (D) 100 W.
16. For the same wastage which lamp is cheapest ?  
 (A) Sodium vapor lamp  
 (B) Mercury vapor lamp  
 (C) Fluorescent tube  
 (D) **GLS lamps.**
17. Optical instruments used for the comparison of candle powers of different sources are known as  
 (A) Candle meters  
 (B) Radio meters  
 (C) Bunsen meter  
 (D) **Photo meter.**
18. Which photometer is used for comparing the lights of different colors ?  
 (A) Bunson photometer  
 (B) Grease spot photometer  
 (C) Lummer Brodhum photometer  
 (D) **Guilds Flicker Photometer**
19. Which photometer depends for its operation on Lambert's cosine law ?  
 (A) **Macbeth Illumino meter**  
 (B) Trotter Illumination Photometer  
 (C) Lummer Brodhum Photometer  
 (D) Guild's Flicker Photometer.
20. Which photometer depends for its operation on Inverse Square Law ?  
 (A) Guilds Flicker Photometer  
 (B) Lummer Brodhum Photometer  
 (C) Macbeth Illuminometer  
 (D) **Trotter Illumination Photometer.**
21. The color temperature of day light is around  
 (A) 50 K  
 (B) 160 K  
 (C) 600 K  
 (D) **6000 K.**
22. 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.

23. Lumen/watt is the unit of  
(A) Light flux  
(B) Luminous intensity  
(C) Brightness  
(D) **Luminous efficiency.**
24. Candela is-the unit for  
(A) Light flux  
(B) **Luminous intensity**  
(C) Brightness  
(D) Luminous efficiency.
25. Which gas is sometimes used in filament lamps ?  
(A) **Argon**  
(B) Krypton  
(C) Nitrogen  
(D) Carbon dioxide.
26. Which bulb operates on lowest power ?  
(A) Night bulb  
(B) Neon bulb  
(C) GLS bulb  
(D) **Torch bulb.**
27. The output of a tungsten filament lamp depends on  
(A) size of lamp  
(B) size of shell  
(C) **temperature of filament**  
(D) all of the above.
28. A zero watt lamp consumes  
(A) no power  
(B) **about 5 to 7 W power**  
(C) about 15 to W power  
(D) about 25 to 30 W power.
29. Melting temperature of tungsten is  
(A) 2000°K  
(B) 2500°K  
(C) 2655°K  
(D) **3655°K.**
30. The life of incandescent lamp is expected to be  
(A) 100 hours  
(B) 200 hours  
(C) **1000 hours**  
(D) 10000 hours.
31. The source of illumination for a cinema projector is  
(A) Incandescent lamp  
(B) Mercury vapor lamp  
(C) Sodium lamp  
(D) **Carbon arc lamp.**
32. Sodium vapor lamps need ionization potential of about  
(A) **5 volts**  
(B) 50 volts  
(C) 100 volts  
(D) 112 volts.
33. When a sodium vapor lamp is switched on, initially the color is  
(A) **Pink**  
(B) Yellow  
(C) Green  
(D) Blue.
34. In a sodium vapor lamp the discharge is first started in the  
(A) **neon gas**  
(B) nitrogen gas  
(C) argon gas  
(D) krypton gas.
35. A auto transformer used with sodium vapor lamp should have  
(A) high efficiency  
(B) high step-up ratio  
(C) high step-down ratio  
(D) **high leakage reactance.**



36. The capacitor used in auto transformer circuit for sodium vapor lamps, is for  
(A) protection against accidental power failure  
(B) controlling illumination level of the lamp  
(C) for regulating discharge voltage  
**(D) for improving the power factor of the circuit.**
37. A mercury vapor lamp gives  
(A) pink light  
(B) yellow light  
(C) **greenish blue light**  
(D) white light.
38. Under the influence of fluorescent lamps sometimes the wheels of rotating machinery appear to be stationary. This is due to the  
(A) fluctuations  
(B) luminescence effect  
(C) **stroboscopic effect**  
(D) low power factor.
39. Power factor is highest in case of  
(A) Mercury arc lamp  
(B) Sodium vapor lamps  
(C) Tube lights  
**(D) GLS lamps.**
40. Which of the following electric discharge lamp gives highest lumens/watt  
(A) Sodium vapor lamp  
(B) **Neon lamp**  
(C) Mercury lamp at low pressure  
(D) Mercury vapor at high pressure.

## 2. Types of Lamps

Position in Question Paper

Total Marks-22

Q.1. a) 2-Marks.

Q.1. b) 2-Marks.

Q.1. c) 2-Marks.

Q.2. a) 4-Marks.

Q.3. a) 4-Marks.

Q.3. d) 4-Marks.

Q.4. a) 6-Marks.

### Descriptive Question

1. State any six factors on efficiency of lighting depends.
2. Draw neat circuit diagram at tungsten filament bulb and give names for different parts.
3. Explain with neat diagram , construction and working of fluorescent tube light.
4. Compare incandescent with fluorescent lamp .
5. Explain with neat sketch construction and working of high pressure mercury vapour lamp.
6. Explain with neat sketch construction and working of sodium vapour lamp .
7. Explain with neat sketch construction and working of halogen lamp.
8. Explain with neat sketch and construction of CFL.
9. State advantages and disadvantages of metal halide lamp.
10. State any four advantages of led lamps.
11. Explain types of lighting schemes with their application.



## MCQ Question

(Total number of Question=Marks\*3=22\*3=66)

Note: Correct answer is marked with **bold**.

- The solid angle subtended at the center of a hemisphere of diameter D will be  
(A)  $4\pi D$  (C)  **$2\pi$**   
(B)  $2\pi D$  (D)  $4\pi$ .
- Which one of the following is a cold cathode lamp ?  
(A) Sodium lamp (C) GSL lamp  
(B) **Neon lamp** (D) Tube light.
- In a mercury vapor lamp light red objects appear black due to  
(A) high wavelength of red objects  
(B) color mixing  
(C) **absence of red light from lamp radiation**  
(D) absorption of red light by the lamp radiation.
- The flicker effect of fluorescent lamp is more pronounced at  
(A) lower voltages (C) **lower frequencies**  
(B) higher voltages (D) higher frequencies.
- The frequency of flickers in a fluorescent lamp at 220 V, 50 Hz supply will be  
(A) 25 per second (C) **100 per second**  
(B) 50 per second (D) 220 per second.
- Wavelength of green color is nearly  
(A) 4000 A (C) 5000 A  
(B) 4500 A (D) **5500 A.**
- One Angstrom is  
(A) 10-6 meter (C) 10-8 cm  
(B) 10-8 meter (D) 10-8 mm.
- Which of the following color has wave-length between green and color ?  
(A) **Yellow** (C) Violet  
(B) Blue (D) None.
- The purpose of providing a choke in a tube light is  
(A) to eliminate corona effects  
(B) to avoid radio interference  
(C) to improve power factor  
(D) **to limit current to appropriate value.**
- A 60 W 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.
11. One lux is the same as  
(A) one lumen/sq. cm  
(B) **one lumen/sq. m**  
(C) one lumen/100 sq. m  
(D) one lumen/1000 sq. m.
12. The vacuum inside an incandescent lamp is of the order of  
(A) 10-2 mm Hg  
(B) 10-3 mm Hg  
(C) **10-4 mm Hg**  
(D) 10-5 mm Hg.
13. Which of the following application does not need ultra-violet lamps ?  
(A) Medical purposes  
(B) Aircraft cockpit dashboard lighting  
(C) **Car lighting**  
(D) Blue print machines.
14. When using ultra-violet lamps the reflector for maximum should be made of  
(A) **aluminium**  
(B) copper  
(C) leaf  
(D) glass.
15. Which of the following combination of gas is filled in lamp and the resulting color is incorrect?  
(A) Neon-red  
(B) Nitrogen-buff  
(C) Carbon dioxide - day light white  
(D) **Magnesium-white.**
16. Which of the, following vapors/gas will give yellow color in a filament lamp ?  
(A) Helium  
(B) Mercury  
(C) **Sodium**  
(D) Magnesium.
17. Which of the following phosphor produces green color  
(A) **Zinc silicate**  
(B) Cadmium borate  
(C) Magnesium tungstate  
(D) Calcium halo phosphate.
18. If  $d$  is the distance of a surface from a source, the illumination of the surface will vary as  
(A)  $d$   
(B)  $2d$   
(C)  $1/d$   
(D)  **$1/d^2$**
19. The level of illumination on surface least depends on  
(A) candle power of the source  
(B) distance of the source  
(C) type of reflector used  
(D) **ambient temperature**
20. The level of illumination from a 100 W incandescent lamp will not increase by  
(A) increasing the supply voltage  
(B) increasing filament temperature  
(C) **increasing glass shell diameter.**
21. The rate of evaporation of tungsten filament in a lamp depends on  
(A) glass shell diameter  
(B) exhaust tube diameter  
(C) **vapor pressure inside**  
(D) none of the above.
22. A gas filled filament bulbs, the gas used is





- (A) oxygen (C) nitrogen  
(B) helium (D) ozone.
23. Heat from the filament of a lamp is transmitted to the surrounding- mainly through  
(A) conduction (C) radiation.  
(B) convection
24. In a fluorescent tube circuit, choke acts as  
(A) starter (C) source of heat  
(B) power factor improving device (D) current limiting device.
25. When a fluorescent lamp is to be operated on dc which of the following additional device must be incorporated in the circuit ?  
(A) Condenser (C) Resistance  
(B) Transformer (D) Inductance.
26. For same rating the amount of radiant heat produced in which of the following lamp is the least ?  
(A) Fluorescent lamp (C) Sodium vapor lamp  
(B) Filament lamp (D) Mercury vapor lamp.
27. The amount of radiant heat produced by a fluorescent lamp is nearly what percent of that of a filament lamp of same rating  
(A) 80% (C) 40%  
(B) 60% (D) 20%.
28. Which of the following lamp gives nearly ultra-violet light ?  
(A) Vacuum type filament lamp (C) Argon filled filament lamp  
(B) Nitrogen filed filament lamp (D) Carbon arc lamp.
29. Luminous flux is  
(A) rate of energy radiation in the form of light waves  
(B) light energy radiated by sun  
(C) part of light energy, radiated by sun which is received on earth  
(D) none of the above.
30. Match the following Column I Column II  
(a) Luminous flux (i) Candela  
(b) Luminous (ii) Candle power x intensity Solid angle  
(c) Lumen (iii) Lumens/W steradians  
(d) Candle power (iv) Lumens.  
(A) a-(i), b-(ii), c-(iii), d-(iv)  
(B) a-(iv), b-(i), c-(ii), d-(iii)  
(C) a-(i), b-(iv), c-(ii), d-(iii)  
(D) a - (iv), b - (iii), c- (i), d - (ii).
31. According to Lambert's law, the illumination on a surface is proportional to



- (A)  $\cos^2 \theta$  (C)  $1/\cos^3 \theta$   
(B)  $\cos^3 \theta$  (D)  $1/\cos^2 \theta$ .
32. A lamp has a mean spherical candle power of 25, the total flux of light from the lamp is  
(A) 25 lumens (C) **314 lumens**  
(B)  $25 \pi$  lumens (D) 625 lumens.
33. Which of the following material can be used for the filaments in incandescent lamps is  
(A) carbon (C) tantalum  
(B) tungsten (D) **any of the above.**
34. The melting point of carbon is  
(A)  $1800^\circ\text{C}$  (C)  **$3500^\circ\text{C}$**   
(B)  $2200^\circ\text{C}$  (D)  $5500^\circ\text{C}$ .
35. Which of the following filament material has the lowest melting point ?  
(A) Carbon (C) Tantalum  
(B) Tungsten (D) **Osmium.**
36. The operating characteristics of an incandescent lamp are materially affected by departure from its normal operating voltage. The total number of lumens given out by the lamp increases with the increase in operating voltage and the relation between them is :  
Lumens output  $\propto V^n$  where n is a constant. The value of n for tungsten varies for  
(A) 0.5 to 0.75 (C) **4 to 5**  
(B) 1.5 to 2.5 (D) 8 to 10
37. Filament lamps operate normally at a power factor of  
(A) 0.5 leading (C) **unity**  
(B) 0.5 lagging (D) 0.8 lagging.
38. Neon gas in sodium vapor lamp  
(A) changes the color of light  
(B) acts as a shield around the filament  
(C) **assists in developing enough heat to vaporize the sodium**  
(D) prevents vaporization of filament.
39. Which of the following is a cold cathode lamps ?  
(A) Sodium vapor lamp (C) Low pressure mercury vapor lamp  
(B) High pressure mercury vapor lamp (D) **Neon lamp.**
40. In fluorescent tubes ballast resistance is connected in series with the choke  
(A) when supply frequency is low (C) **when tube operates on dc supply**  
(B) to reduce radio interference (D) to reduce stroboscope effects.
41. While comparing tungsten filament lamps with fluorescent tubes, all of the following are the advantages in favor of tungsten filament lamp EXCEPT  
(A) **Longer life** (C) More brightness  
(B) Less costly (D) Simple installation.



42. The 220 V lamps, one of 60 W and the other of 75 W are connected in series across a 440 V supply. The potential difference across 60 W lamp will be  
(A) 195 V (C) **245 V**  
(B) 220 V (D) 440 V.
43. The potential difference across 75 watt lamp will be  
(A) **195 V** (C) 245 V  
(B) 220 V (D) 440 V.
44. Assuming candle power to be proportional to fourth power of the voltage, the candle power of 60 W lamps under above conditions as a percentage of its value under normal operation at 220 V will be  
(A) 110% (C) 220%  
(B) **1549%** (D) 440%.
45. Which of the following lamp has least capacity to sustain voltage fluctuations ?  
(A) sodium vapor lamp (C) **incandescent lamp**  
(B) fluorescent lamp (D) mercury vapor lamp.
46. In neon signs argon gas is used for  
(A) yellow color (C) **red color**  
(B) blue color (D) green color.
47. In neon signs, helium is used for  
(A) **yellow color** (C) red color  
(B) green color (D) blue colour.
48. In neon signs, neon with a mixture of mercury gives  
(A) green color (C) red color  
(B) blue color (D) **yellow color.**
49. The electrodes of neon tubes work at  
(A) very low temperatures (C) 400 to 440 volts  
(B) ordinary voltages (D) 2000 to 6000 volts.
50. Glare may result from  
(A) excessive lighting contrast in the field of vision  
(B) excessive luminance  
(C) **either of (A) or (B) above**  
(D) none of the above
51. To avoid glare  
(A) **object should be viewed from a distance**  
(B) object should be viewed from a close vicinity  
(C) object should be moved constantly  
(D) viewer should move constantly.
52. The light output of GLS lamps is normally in the range



- (A) 10 to 18 lumens/watt  
(B) 50 to 80 lumens/watt  
(C) 100 to 180 lumens/watt  
(D) 200 to 300 lumens/watt.
53. Nitrogen or argon is filled in GLS lamps to  
(A) reduce the glare  
(B) improve efficiency  
(C) change the color of light  
(D) **retard evaporation of tungsten filament.**
54. In case of frosted GLS lamps, frosting of shell is done by  
(A) ozone  
(B) ammonia  
(C) **acid etching**  
(D) salt water.
55. The luminous flux reaching the working plane least depends on  
(A) the lumen output of the lamps  
(B) proportion of the room  
(C) reflectance of internal surfaces  
(D) **color of the working plane surface.**
56. Which of the following lamp gives nearly monochromatic light ?  
(A) **Sodium vapor lamp**  
(B) GLS lamp  
(C) Tube light  
(D) Mercury vapor lamp.
57. Materials which reflect all wavelengths in the light spectrum appear to be  
(A) **black to white**  
(B) transparent  
(C) opaque  
(D) green to red.
58. An object which appears red to the eyes, absorbs  
(A) green radiations  
(B) blue radiations  
(C) violet radiations  
(D) **all of the above.**
59. Glare is the result of  
(A) very low luminance  
(B) normal luminance  
(C) **excessive luminance**  
(D) none of the above.
60. Glow lamps  
(A) **have cold cathode**  
(B) have hot cathode  
(C) cannot withstand shocks  
(D) consume high power.
61. The illumination required for normal reading is around  
(A) **500 lumens/m<sup>2</sup>**  
(B) 300 - 400 lumens/m<sup>2</sup>  
(C) 100 - 250 lumens/m<sup>2</sup>  
(D) 60 - 100 lumens/m<sup>2</sup>.
62. Which of the following surface has the lowest reflection factor for white light ?  
(A) Aluminium sheet  
(B) White plaster work  
(C) **Blue curtains**  
(D) White oil paint
63. Which of the following glass transmits the maximum light ?



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- (A) Serrated glass  
(B) Opalescent glass
64. Which of the following glass transmits the least amount of light?  
(A) Clear glass  
(B) Serrated glass
65. B-15 size cap for GLS lamp indicates that  
(A) **photography.**  
(B) cap is screw type
- (C) **Clear glass**  
(D) Milk glass.
- (C) **Milk glass**  
(D) Opalescent glass.
- (C) cap is made of brass  
(D) cap is filled by cement



## 3. Illumination control and control circuits

Position in Question Paper

Total Marks-24

Q.1. a) 2-Marks.

Q.1. b) 2-Marks.

Q.1. c) 2-Marks.

Q.2. a) 4-Marks.

Q.3. a) 4-Marks.

Q.3. d) 4-Marks.

Q.4. a) 6-Marks.

### Descriptive Question

1. State the purpose of lightning control equipments.
2. List different types of lightning control methods .
3. Explain working of salt water dimmer with help of diagram.
4. Draw neat circuit diagram of resistance dimmer circuit and explain in its brief working.
5. Explain autotransformer dimmer with help of diagram.
6. Explain working principle and construction of thyristor operated dimmer.
7. Draw and explain how one lamp can be controlled by two switches.
8. Explain triac operated dimmer .
9. Explain with neat sketch single lamp control by single switch.
10. Draw and explain single lamp control by two point , three point and four point method
11. Explain difference between dimming control and on / off control in lightning control

## MCQ Question

(Total number of Question=Marks\*3=24\*3=72)

Note: Correct answer is marked with **bold**.

- E-40 caps arc generally used for GLS lamps of wattage above  
(A) 25 W (C) **300W**  
(B) 100W (D) 1000 W.
- In case of GLS lamps as the supply voltage increases, which of the following decreases ?  
(A) Lumen output (C) **Life**  
(B) Power consumption (D) Efficiency.
- The advantage of halogen lamp is  
(A) no depreciation of light output  
(B) increased operating temperature with increased luminous efficiency  
(C) reduced dimensions of the lamp  
(D) **all of the above.**
- Halogen lamps are useful for the illumination of  
(A) Sports grounds (C) Airports  
(B) Parks (D) **All of the above.**
- Coating of fluorescent lamps  
(A) **converts ultra-violet, radiations into visible light**  
(B) converts visible light into ultra-violet radiations  
(C) reduces glare  
(D) none of the above.
- The light output of fluorescent lamps is around  
(A) 10 lumens/watt (C) **70 lumens/watt**  
(B) 20 lumens/watt (D) 200 lumens/watt.
- Which of the following is preferred for air conditioned spaces ?  
(A) GLS lamp (C) Mercury vapor lamp  
(B) **Fluorescent tube** (D) Sodium vapor lamp.
- The normal life span of a fluorescent lamp is  
(A) 500 hours (C) 1500 hours  
(B) 1000 hours (D) **7500 hours.**
- The color of light depends on  
(A) wavelength  
(B) frequency  
(C) **wavelength and frequency**  
(D) wavelength, frequency speed and intensity.



10. The disadvantage of fluorescent lamps as compared to GLS lamps is  
(A) noise in choke (C) high cost  
(B) stroboscope effect (D) **all of the above.**
11. In case of a fluorescent lamp if only the ends of the lamp remain lighted it indicates  
(A) **a short circuited starter** (C) a defective lube  
(B) a defective choke (D) defective wiring.
12. Blinking of a fluorescent tube may be due to  
(A) low circuit voltage (C) low temperature  
(B) low ballast rating (D) **any of the above.**
13. Radio interference generally results due to  
(A) GLS lamps (C) **Fluorescent lamps**  
(B) Halogen lamps (D) Sodium lamp
14. A fluorescent tube can be operated on  
(A) AC only  
(B) DC only  
(C) **Both AC as well as DC.**
15. The ignition voltage for sodium lamps is  
(A) 100 to 150 volts . (C) 400 to 440 volts  
(B) 200 to 220 volts (D) **400 to 600 volts.**
16. A leak transformer is provided with  
(A) frosted GLS lamps (C) **fluorescent lamps**  
(B) high wattage GLS lamps (D) sodium lamps.
17. Leak transformer in sodium lamps initially provides  
(A) low voltage (C) **high voltage**  
(B) high current (D) none of the above.
18. The color of sodium lamp is  
(A) blue (C) red  
(B) **yellow** (D) white.
19. Sodium lamps are used for:  
(A) reading rooms (C) auditoria  
(B) street lights (D) **libraries.**
20. The average life of sodium lamps is around  
(A) 1000 hours (C) **6000 hours**  
(B) 2500 hours (D) 12000 hours.
21. High pressure mercury vapor light contains  
(A) yellow color (C) red color  
(B) **bluish white color** (D) white color.
22. The average life high pressure mercury vapor lamps is



- (A) 500 hours (C) **9000 hours**  
(B) 1000 hours (D) 20,000 hours.
23. High pressure mercury vapor lamps are generally used in  
(A) factories (C) shopping centers  
(B) railway yards (D) **all of the above.**
24. A substance which changes its electrical resistance when illuminated by light is called  
(A) photovoltaic (C) **photo-conductive**  
(B) photoelectric (D) none of the above.
25. Wavelength for blue color  
(A) **4400 A** (C) 6150 A  
(B) 5250 A (D) 5950 A.
26. Radio interference from a fluorescent lamp can be reduced by  
(A) putting two lamps in parallel  
(B) eliminating choke  
(C) **putting a capacitor across the lamp**  
(D) none of the above.
27. Dimming systems for lights are used in  
(A) theatres (C) ball room  
(B) auditoriums (D) **all of the above.**
28. Which of the following can be used as a light dimming device ?  
(A) Auto transformer (C) SCR  
(B) Variable reaction (D) **Any of the above.**
29. Which of the following is difficult to adopt for dimming ?  
(A) GLS lamps (C) **Fluorescent lamps**  
(B) Cold cathode lamps (D) All of the above.
30. Heat from light source is particularly of importance while  
(A) designing for illumination level (C) **designing for air conditioning**  
(B) designing for floor space utilization (D) all of the above.
31. In electric discharge lamps for stabilizing the arc  
(A) a condenser is connected in parallel to supply  
(B) a condenser is connected in series to supply  
(C) **a variable resistor is connected in the circuit**  
(D) a reactive choke is connected in series with supply.
32. The lens of the eye to focuses an image on the  
(A) corona (C) calorie  
(B) membrane (D) **retina.**
33. The sensors in the eye arc known as



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- (A) rods and cones**
- (B) wires and nerves
- (C) retina and antenna
- (D) high and low



## 4. Illumination for interior application

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Position in Question Paper

Total Marks-20

Q.1. a) 2-Marks.

Q.2. a) 4-Marks.

Q.3. a) 4-Marks.

Q.3. d) 4-Marks.

Q.4. a) 6-Marks.

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### Descriptive Question

1. What are the factors governing the illuminance of visual task in interior lighting scheme ?
2. State and explain six factors while considering the designing the illumination for interior location of commercial .
3. Which lamps are used for malls and supermarkets and why ?
4. State the design considerations for interior location of commercial premises .
5. State illumination level for domestic lighting .
6. state any four applications of spot lightning .
7. State the design considerations for interior location of residential unit.
8. A room  $30\text{ m} \times 20\text{ m}$  is illuminated 20 no. of 200 w lamp. The mscp of each lamp is If utilization factor , then find out average illumination produced on floor.
9. 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 above the work bench , assuming 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.
10. A uniform illumination of 80 lux obtained on the floor of room measuring  $15\text{ m} \times 15\text{ m}$  by arranging electric light suitably . calculate no. of lamps and watt rating of each lamp if lamp is 15 lux/watt . assume and write suitable values required in this calculation.
11. Write the recommended level of illumination in lux for the following areas in office
  - a) Entrance hall
  - b) Reception area
  - c) Conference room
  - d) Stairs
  - e) Lift landing
10. State the recommended illumination level of any four locations in a restaurant.



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12. What are the design considerations while designing illumination scheme for an industrial unit.
13. State any four benefits of good industrial lighting.
14. Compare commercial lighting and industrial lighting



## MCQ Question

(Total number of Question=Marks\*3=20\*3=60)

Note: Correct answer is marked with **bold**.

- The radiant efficiency of the luminous source depends on
  - The shape of the source
  - The temperature of the source**
  - The wavelength of the light rays
  - All of the above
- Lightwave travel with a velocity of
  - $3 \times 10^{10}$  cm/s**
  - $3 \times 10^{12}$  cm/s
  - $3 \times 10^{15}$  cm/s
  - $3 \times 10^{18}$  cm/s
- Carbon arc lamps are commonly used in
  - Domestic lighting
  - Street lighting
  - Cinema Projector**
  - Photography
- The unit of solid angle is
  - Solid Angle**
  - Radian
  - Steradian
  - Candela
- Candela is the unit of
  - Luminous flux
  - Luminous intensity**
  - Wavelength
  - None of the above
- The unit of luminous flux is
  - Steradian
  - Candela
  - Lumen**
  - Lux
- 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. Above statement is associated with
  - Planck's law
  - Macbeth's law of illumination
  - Bunsen's law of illumination
  - Lambert's cosine law**
- Which curve represents the life of the lamp?
  - Curve A**
  - Curve B
  - Curve C
  - Curve D
- Illumination level required for precision work is around
  - $50 \text{ lm/m}^2$
  - $100 \text{ lm/m}^2$
  - $200 \text{ lm/m}^2$
  - $500 \text{ lm/m}^2$**
- Which of the following will needs the highest level of illumination?
  - Proofreading**
  - Bed Room
  - Hospital wards
  - Railway platforms
- Which of the following will need the lowest level of illumination?
  - Displays
  - Fine engraving
  - Railway platform**
  - Auditorium
- Which of the following lamps gives nearly monochromatic light?
  - Sodium vapor lamp**
  - GLS Lamp





- c) Tube light  
13. The illumination level in houses is in the range  
a) 10-20 lumens/m<sup>2</sup>  
b) 30-40 lumens/m<sup>2</sup>  
14. The luminous efficiency of a fluorescent tube is  
a) 5-10 lumens/watt  
b) 15-20 lumens/watt  
15. One lumen per square meter is the same as  
a) **One lux**  
b) One Candela  
16. The standard wattage of 3ft. fluorescent tube is  
a) 10 W  
b) **40 W**  
17. For the same wattage which lamp is cheapest?  
a) Sodium Vapor Lamp  
b) Mercury Vapor Lamp  
18. The optical instrument used for the comparison of candle power of different sources are known as  
a) Candle meters  
b) Radiometers  
19. Which photometer is used for comparing the light of different colors?  
a) Bunsen photometer  
b) Grease spot Photometer  
20. Which photometer is used for comparing the light of the same colors?  
a) **Bunsen photometer**  
b) Guilds Flicker Photometer  
21. The Principle of the Simple photometer is based upon  
a) **Inverse Square Law**  
b) Square Law  
22. Two electric bulbs have tungsten filament of the same thickness. If one of them gives 60 W and the other gives 100 W, then  
a) **60W and 100 W lamp filaments have equal length**  
b) 60 W lamp filament has shorter length  
c) 100 W lamp filament has the longer length  
d) 60 W lamp filament has the longer length  
22. 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  
23. The color of the light given out by a sodium vapor discharge lamp is  
a) Pink  
b) Bluish Green  
c) **Yellow**  
d) Blue  
24. Lumen/watt is the unit of  
a) Light Flux  
b) Luminous Intensity
- d) Mercury vapor lamp  
c) 40-75 lumens/m<sup>2</sup>  
d) **100-140 lumens/m<sup>2</sup>**  
c) 30-40 lumens/watt  
d) **60-65 lumens/watt**  
c) One foot candle  
d) One lumen meter  
c) 65 W  
d) 100 W  
c) Fluorescent tube  
d) **GLS Lamp**  
c) Bunsen meter  
d) **Photometer**  
c) Lummer Brodhum Photometer  
d) **Guilds Flicker Photometer**  
c) Both 1 & 2  
d) None of the above  
c) Inverse Law  
d) Lambert cosine Law





- c) Brightness
25. The S.I unit of Luminance is
- a) Candela  
b) Lux
26. Which gas is sometimes used in filament lamps?
- a) Argon**  
b) Krypton
27. Which bulb operated on the lowest power?
- a) Night Bulb  
b) Neon Bulb
28. The output of a tungsten filament lamp depends on
- a) Size of lamp  
b) Size of shell
29. A zero watt lamp consumes
- a) No power  
**b) About 5 to 7 W power**
30. Melting temperature of tungsten is
- a) 2000° K  
b) 2500° K
31. The life of the incandescent lamp is expected to be
- a) 100 Hours  
b) 200 Hours
32. The source of illumination for a cinema projector is
- a) Incandescent Lamp  
b) Mercury Vapour Lamp
33. In the case of frosted GLS lamps, the frosting of the shell is done by
- a) Ozone  
b) Ammonia
34. Nitrogen or argon is filled in GLS lamps to
- a) Reduce the glare  
b) Improve efficiency  
c) Change the color of light  
**d) Retard evaporation of tungsten filament**
35. Which of the following lamp has the least capacity to sustain voltage fluctuations?
- a) Sodium vapor lamp  
b) Fluorescent lamp
36. The light output of GLS lamps is normally in the range
- a) 10 to 18 lumens/watt**  
b) 50 to 80 lumens/watt
37. In neon signs, argon gas is used for
- a) Yellow color  
**b) Blue color**
38. Glare may result from
- d) Luminous Efficiency**
- c) Candela/m<sup>2</sup>**  
d) m<sup>2</sup>/candela
- c) Nitrogen  
d) Carbon dioxide
- c) GLS Bulb  
**d) Torch Bulb**
- c) Temperature of filament**  
d) All of the above
- c) About 15 to 20 W power  
d) About 25 to 30 W power
- c) 2655° K  
**d) 3655° K**
- c) 1000 Hours**  
d) 10000 Hours
- c) Sodium Lamp  
**d) Carbon Arc lamp**
- c) Acid etching**  
d) Saltwater
- c) Incandescent lamp**  
d) Mercury vapor lamp.
- c) 100 to 180 lumens/watt  
d) 200 to 300 lumens/watt
- c) Red color  
d) Green color

- a) Excessive lighting contrast in the field of vision  
 b) Excessive luminance
39. In neon signs, neon with a mixture of mercury gives  
 a) Green color  
 b) Blue color
40. The electrodes of neon tubes work at  
 a) Very low temperatures  
 b) Ordinary voltages
- c) **Either of (A) or (B) above**  
 d) None of the above
- c) **Red color**  
 d) Yellow color
- c) 400 to 440 volts  
 d) **2000 to 6000 volts**

**Questions 41 to 43 refer to data given below :**

A 60 CP 250 V metal filament lamp has a measured candle power of 17.5 CP at 260 V and 50 C.P. at 240 V.

41. If the equation for C and V is  $C = aV^b$  where C = candlepower and V = voltage, the value of constant b is

- a) **4.5**  
 b)  $0.98 \times 10^{-9}$
42. The value of constant "a" is  
 a)  **$0.98 \times 10^{-9}$**   
 b)  $0.98 \times 10^{-7}$
43. The change in candle power per volt at 250 V will be  
 a) **1.1 V**  
 b) 4.4 V
- c)  $0.98 \times 10^{-6}$   
 d) 450
- c)  $0.98 \times 10^{-5}$   
 d)  $0.98 \times 10^{-3}$
- c) 8.8 V  
 d) 17.6 V

**Questions 44 to 46 refer to data given below:**

The 220 V lamps, one of 60 W and the other of 75 W are connected in series across a 440 V supply.

44. The potential difference across 60 W lamp will be  
 a) 195 V  
 b) 220 V
45. The potential difference across 75-watt lamp will be  
 a) **193 V**  
 b) 220 V
46. The essential requirement of good heating elements are  
 a) High Specific resistance  
 b) Free from oxidation  
 c) Low-temperature coefficient of resistance  
 d) **All of the above**
- c) **242 V**  
 d) 440 V
- c) 245 V  
 d) 440 V

**Questions 47 to 48 refer to data given below:**

A 110 V lamp 16 C.P. and a lamp of the same material and worked at the same efficiency develops 25 CP on 220 V.

47. The ratio of diameters of the filaments will be  
 a) 0.54  
 b) 1.0





## 5. Lighting for outdoor and special application

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Position in Question Paper

Total Marks-20

Q.1. a) 2-Marks.

Q.2. a) 4-Marks.

Q.3. a) 4-Marks.

Q.3. d) 4-Marks.

Q.4. a) 6-Marks.

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### Descriptive Question

1. State general requirements of factory lighting.
2. Explain general rule, general principles for street lighting.
3. State main objectives of street lighting.
4. Explain any four important terms in road lighting.
5. Explain the illumination level for street lighting mounting height of lamps in street lighting and types of lamps used for street lighting.
6. Explain general principles employed in the design of street lighting .
7. State any four specific requirements of street lighting .
8. What is flood lighting ? state it's purpose.
9. State the functions of luminaries used in flood lighting.
10. Define the terms :
  - a) beam factor
  - b) waste light factor related to flood lighting.
11. State any four characteristics of flood lighting.
12. The front of a building 50 m × 16 m is illuminated by 16 no's of 1000 watt lamps arranged so that uniform illumination on the surface is obtained. Assume



a) Luminous efficiency = 17.4      c) Depreciation factor = 1.3

b) Utilization factor = 0.4      d) Waste light factor

Determine the illumination on the surface.

13. Explain railway platform lighting .
14. How decorative lighting is useful for advertising section ?
15. Write a note on horticulture and agriculture lighting.
16. Explain the different lighting schemes used for agriculture and horticultural applications .
17. Explain lighting scheme in a hospital .
18. What type of luminaires are required for in hospital ?
19. Suggest the various illumination levels required in various area of healthcare center and hospitals.
20. State different types of lamp used for decoration purposes .
21. State any four desirable characteristics of lighting required in stage area.
22. State any four desirable characteristics of lighting required in auditorium.
23. State any four requirements of illumination of shipyards areas.
24. State the importance of light house in the shipyards and state different types of lights are provided by light house.





## MCQ Question

(Total number of Question=Marks\*3=20\*3=60)

Note: Correct answer is marked with **bold**.

- The radiant efficiency of the luminous source depends on
  - The shape of the source
  - The temperature of the source**
  - The wavelength of the light rays
  - All of the above
- Lightwave travel with a velocity of
  - $3 \times 10^{10}$  cm/s**
  - $3 \times 10^{12}$  cm/s
  - $3 \times 10^{15}$  cm/s
  - $3 \times 10^{18}$  cm/s
- Carbon arc lamps are commonly used in
  - Domestic lighting
  - Street lighting
  - Cinema Projector**
  - Photography
- The unit of solid angle is
  - Solid Angle**
  - Radian
  - Steradian
  - Candela
- Candela is the unit of
  - Luminous flux
  - Luminous intensity**
  - Wavelength
  - None of the above
- The unit of luminous flux is
  - Steradian
  - Candela
  - Lumen**
  - Lux
- 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. Above statement is associated with
  - Planck's law
  - Macbeth's law of illumination
  - Bunsen's law of illumination
  - Lambert's cosine law**
- Which curve represents the life of the lamp?
  - Curve A**
  - Curve B
  - Curve C
  - Curve D
- Illumination level required for precision work is around
  - 50 lm/m<sup>2</sup>
  - 100 lm/m<sup>2</sup>
  - 200 lm/m<sup>2</sup>
  - 500 lm/m<sup>2</sup>**
- Which of the following will needs the highest level of illumination?
  - Proofreading**
  - Bed Room
  - Hospital wards
  - Railway platforms
- Which of the following will need the lowest level of illumination?
  - Displays
  - Fine engraving
  - Railway platform**
  - Auditorium
- Which of the following lamps gives nearly monochromatic light?
  - Sodium vapor lamp**
  - GLS Lamp





- c) Tube light  
13. The illumination level in houses is in the range  
a) 10-20 lumens/m<sup>2</sup>  
b) 30-40 lumens/m<sup>2</sup>  
14. The luminous efficiency of a fluorescent tube is  
a) 5-10 lumens/watt  
b) 15-20 lumens/watt  
15. One lumen per square meter is the same as  
a) **One lux**  
b) One Candela  
16. The standard wattage of 3ft. fluorescent tube is  
a) 10 W  
b) **40 W**  
17. For the same wattage which lamp is cheapest?  
a) Sodium Vapor Lamp  
b) Mercury Vapor Lamp  
18. The optical instrument used for the comparison of candle power of different sources are known as  
a) Candle meters  
b) Radiometers  
19. Which photometer is used for comparing the light of different colors?  
a) Bunsen photometer  
b) Grease spot Photometer  
20. Which photometer is used for comparing the light of the same colors?  
a) **Bunsen photometer**  
b) Guilds Flicker Photometer  
21. The Principle of the Simple photometer is based upon  
a) **Inverse Square Law**  
b) Square Law  
22. Two electric bulbs have tungsten filament of the same thickness. If one of them gives 60 W and the other gives 100 W, then  
a) **60W and 100 W lamp filaments have equal length**  
b) 60 W lamp filament has shorter length  
c) 100 W lamp filament has the longer length  
d) 60 W lamp filament has the longer length  
22. 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  
23. The color of the light given out by a sodium vapor discharge lamp is  
a) Pink  
b) Bluish Green  
c) **Yellow**  
d) Blue  
24. Lumen/watt is the unit of  
a) Light Flux  
b) Luminous Intensity



- c) Brightness
25. The S.I unit of Luminance is
- a) Candela  
b) Lux
26. Which gas is sometimes used in filament lamps?
- a) Argon**  
b) Krypton
27. Which bulb operated on the lowest power?
- a) Night Bulb  
b) Neon Bulb
28. The output of a tungsten filament lamp depends on
- a) Size of lamp  
b) Size of shell
29. A zero watt lamp consumes
- a) No power  
**b) About 5 to 7 W power**
30. Melting temperature of tungsten is
- a) 2000° K  
b) 2500° K
31. The color of sodium lamp is
- a) Blue  
b) Yellow
32. Sodium lamps are used for:
- a) reading rooms  
b) street lights
33. The average life of sodium lamps is around
- a) 1000 hours  
b) 2500 hours
34. High pressure mercury vapor light contains
- a) yellow color  
b) bluish white color
35. The average life high pressure mercury vapor lamps is
- a) 500 hours  
b) 1000 hours
36. High pressure mercury vapor lamps are generally used in
- a) factories  
b) railway yards
37. A substance which changes its electrical resistance when illuminated by light is called
- a) photovoltaic  
b) photoelectric
38. Wavelength for blue color
- a) 4400 A  
b) 5250 A
- d) Luminous Efficiency**
- c) Candela/m<sup>2</sup>**  
d) m<sup>2</sup>/candela
- c) Nitrogen  
d) Carbon dioxide
- c) GLS Bulb  
**d) Torch Bulb**
- c) Temperature of filament**  
d) All of the above
- c) About 15 to 20 W power  
d) About 25 to 30 W power
- c) 2655° K  
**d) 3655° K**
- c) Red  
d) white.
- c) auditoria  
d) libraries.
- c) 6000 hours  
d) 12000 hours.
- c) red color  
d) white color.
- c) 9000 hours  
d) 20,000 hours.
- c) shopping centers  
d) all of the above.
- c) photo-conductive  
d) none of the above.
- c) 6150 A  
d) 5950 A.



Maratha Vidya Prasarak Samaj's

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39. Radio interference from a fluorescent lamp can be reduced by
- a) putting two lamps in parallel
  - b) eliminating choke
  - c) putting a capacitor across the lamp
  - d) none of the above.