

## Questions and Answers for Participant handbook - Supervisor -Street Light Installation & Maintenance

### SECTION I - THEORY

#### A. Fill in the Blanks

1. India has an installed Power Generation capacity of \_\_\_\_\_ GW
  - a. 305.55
  - b. 330
  - c. 3000.73
  - d. 30.55
  - e. None of the Above
2. \_\_\_\_\_ is responsible for the inter-state transmission of electricity and the development of national grid.
  - a. Jharkhand State Electricity Board
  - b. The Power Grid Corporation of India
  - c. NHPC Ltd
  - d. Nuclear Power Corporation of India (NPCIL)
  - e. None of the Above
3. The power system can be divided into these broad sections
  - a. Pilferage, Transmission, Distribution and Utilisation
  - b. Generation, Transgression, Distress and Utilisation
  - c. Generation, Transmission, and Distribution and Utilisation
  - d. Generator, Transmitter, and Distributor and Underperformance
  - e. None of the Above
4. Power generation is the process of generating electric power from \_\_\_\_\_ .
  - a. Water Energy
  - b. Mineral Resources
  - c. Other sources of primary energy
  - d. Solar Energy
  - e. All of the Above
5. A transmission system consists of \_\_\_\_\_
  - a. Transmission lines and Substations
  - b. Extra High Voltage lines
  - c. Transmission Towers
  - d. All of the Above
  - e. None of the Above
6. \_\_\_\_\_ is the force required to make electricity flow through a conductor
  - a. Voltage
  - b. Current
  - c. Ampere
  - d. Resistance

- e. None of the Above
- 7. Voltage is measured by a \_\_\_\_\_
  - a. Ohm Meter
  - b. Lux Meter
  - c. Ammeter
  - d. Demeter
  - e. Voltmeter
- 8. Current is measured by a \_\_\_\_\_
  - a. Ohm Meter
  - b. Lux Meter
  - c. Ammeter
  - d. Demeter
  - e. Voltmeter
- 9. Resistance is measured by a \_\_\_\_\_
  - a. Ohm Meter
  - b. Lux Meter
  - c. Ammeter
  - d. Demeter
  - e. Voltmeter
- 10. Ohm's law can be expressed as \_\_\_\_\_
  - a.  $V = IR$
  - b.  $I = V/R$
  - c.  $R = V/I$
  - d. All of the Above
  - e. None of the Above
- 11. An electric circuit can be \_\_\_\_\_
  - a. Series
  - b. Parallel
  - c. Both a) and b)
  - d. Either of a) or b)
  - e. None of the Above
- 12. Current is \_\_\_\_\_
  - a. Flow of protons
  - b. Flow of electrons
  - c. Flow of neutrons
  - d. All of the Above
  - e. None of the above
- 13. The unit of voltage is \_\_\_\_\_
  - a. Volt
  - b. Amepere
  - c. Watt
  - d. Henrys
  - e. Lux
- 14. The unit of inductance is \_\_\_\_\_
  - a. Ohm
  - b. Mho
  - c. Farad

- d. Henry
  - e. Volt
15. 1 KW =
- a. 1 W
  - b. 10 W
  - c. 100 W
  - d. 10000 W
  - e. 1000 W
16. 1 KVA =
- a. 1000 VA
  - b. 1 VA
  - c. 10 VA
  - d. 100 VA
  - e. 10000 VA
17. The highest possible efficiency for electric light sources is
- a. 183 lumens per watt
  - b. 283 lumens per watt
  - c. 583 lumens per watt
  - d. 383 lumens per watt
  - e. 683 lumens per watt
18. First Practical Incandescent Bulb Invented by \_\_\_\_\_
- a. Thomas Alva Edison
  - b. Blaise Pascal
  - c. Marie Curie
  - d. Nick Holonya Jr
  - e. Shuji Nakamura
19. Blue LED Invented by \_\_\_\_\_
- a. Thomas Alva Edison
  - b. Blaise Pascal
  - c. Marie Curie
  - d. Nick Holonya Jr
  - e. Shuji Nakamura
20. Sodium lamp was first produced commercial by.
- a. Philips
  - b. Osram
  - c. GE
  - d. Nicha
  - e. MLS
21. CFL was first launched by Philips in
- a. 1960
  - b. 1970
  - c. 1980
  - d. 1990
22. In 1959 which company was first to patent halogen lamp.
- a. Philips
  - b. Westing house

- c. GE
  - d. Osram
  - e. Nichia
23. Incandescent Lamps works by the principle of
- a. Gas discharge
  - b. Gas filing
  - c. Heating of filament
  - d. Ballast
  - e. None of the Above
24. LED works on the principle of
- a. Ballasting
  - b. Movement of Light
  - c. Movement of electronics in semiconductor
  - d. Heating of filament
  - e. None of the Above
25. An international unit of measurement used to describe the amount of light that a light source produces or emits
- a. Lumen
  - b. Voltage
  - c. Wattage
  - d. Amperes
  - e. None of the Above
26. The overall light output of a lamp or luminaire measured in lumens is called
- a. Watt
  - b. Lumen Flux
  - c. CRI
  - d. Efficacy
  - e. None of the Above
27. 1 Unit of Electricity consumption =
- a. 1 W/h
  - b. 10 W/h
  - c. 100 W/h
  - d. 10000 W/h
  - e. 1000 W/h
28. Standards voltage supply in India
- a. 220 V AC
  - b. 440 V AC
  - c. 110 V AC
  - d. 12 V DC

**B. Match the elements of Group A with Group B**

Group A	Group B
1. Ammeter	a) GE (8)
2. Voltmeter	b) kWh (4)
3. Ohm meter	c) Philips (9)
4. Billing unit for energy	d) Power $\times$ Time (6)
5. Unit Consumed	e) Current (1)
6. Energy	f) Resistance (3)
7. Power	g) GE (10)
8. First practical Halogen Lamp	h) Voltage (2)
9. First Sodium Lamp	i) No. of Hours of Operation $\times$ Power in kW (5)
10. First Fluorescent Tube	j) Voltage $\times$ Current (7)

### C. Fill in the Blanks

- a. The lifespan of CFL lamps is typically \_\_\_\_\_
- b. 3200k color temperature is considered \_\_\_\_\_
- c. Luminaries flux is a measure of the total light output of \_\_\_\_\_
- d. Color rendering index ( CRI ) tells you how accurately color appears under the \_\_\_\_\_
- e. Efficacy compares light output to \_\_\_\_\_
- f. Ampere (Amp) is the measure of \_\_\_\_\_
- g. A down light is recessed in \_\_\_\_\_
- h. Alternating current is generally supplied to our \_\_\_\_\_
- i. Direct current is usually supplied by \_\_\_\_\_
- j. LED drive acts as \_\_\_\_\_ for LEDs.
- k. Heat sink lowers the \_\_\_\_\_ within a light fixtures by dissipating the heat of LEDs
- l. Solid State Lighting (SSL ) Is another name for \_\_\_\_\_ light
- m. \_\_\_\_\_ is a lighting measurement standard and test that designates uniform test methods for measuring lumen maintenance for LEDs
- n. \_\_\_\_\_ is a lighting measurement standard that covers testing procedures for determining how the color and light emitted from LEDs is perceived by people and how power is measured for LEDs

### D. Mark the following as True of False

#### 1. Functions of Local bodies

- |  |                               |                                |
|--|-------------------------------|--------------------------------|
| i. To provide safety and light                   | True <input type="checkbox"/> | False <input type="checkbox"/> |
| ii. To provide energy efficiency street lighting | True <input type="checkbox"/> | False <input type="checkbox"/> |

iii. To charge taxes on street lights True  False

2. The salient features of the Street Light National Program (SLNP) include

i. Will convert present Streetlights with LED Street Light True  False

ii. Will replace 3.5 crore Conventional lights with LED street lights True  False

iii. Will save Rs. 5,500 crores to Municipalities True  False

iv. Street lights will be distributed free to public True  False

3. Roles and Responsibilities of Supervisor

i. To install street lights True  False

ii. To test installed street lights True  False

iii. To maintain street lights True  False

iv. Do not report to any theft of street light True  False

v. To use proper connector instead of insulation tape True  False

vi. If fuse blows, to remove it and connect wire direct to restore power  
True  False

4. Skills that a street light supervisor requires are

i. Must have good knowledge of electrical theory True  False

ii. Must follow all safety practices True  False

iii. Must understand religious symbols True  False

iv. Must have minimum experience of 25 years True  False

v. Should be able to climb 300 ft True  False

vi. Must be able to understand blue prints True  False

5. Assistant Technician must escalate the following to Supervisor

i. Right of way problem during the erection of poles. True  False

ii. Accidents that occur during the installation of streetlights True  False

iii. Breakdown of LT Lines True  False

iv. Fight with local residents True  False

v. Damage to equipment True  False

6. State the statements are true or false

i. Street lights prevent accidents and increase safety True  False

ii. Pedestrian fatalities are 3 to 6.75 times more likely in the dark True  False

iii. Street lighting reduces pedestrian crashes by approximately 5%. True  False

- |       |  |      |                          |       |                          |
|-------|--|------|--------------------------|-------|--------------------------|
| iv.   | A pole can be located anywhere on the road                 | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| v.    | A street light pole is required to be properly grounded    | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| vi.   | Foundation for pole must be prepared as per design         | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| vii.  | The dug up area can be covered with Dust and Malba         | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| viii. | All Luminaires for street lights should meet BIS Standards | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| ix.   | Wiring of any voltage can be used for street lights        | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| x.    | Grounding is required at each street light                 | True | <input type="checkbox"/> | False | <input type="checkbox"/> |
| xi.   | Every street light must have a cut-off fuse                | True | <input type="checkbox"/> | False | <input type="checkbox"/> |

### E. Select the Correct Option

1. The first electric street lighting employed arc lamps were developed by \_\_\_\_\_ in 1875
  - a. Pavel Yablochkov
  - b. Thomas Edison
  - c. Nikola Tesla
  - d. Geoffery Philips
  - e. None of the Above
2. Street lighting has been found to reduce pedestrian crashes by approximately \_\_\_\_\_
  - a. 5%
  - b. 25%
  - c. 40%
  - d. 50%
  - e. 100%
3. Foundation types are \_\_\_\_\_
  - a. Concrete
  - b. Helical
  - c. Direct Burial
  - d. Decorative Ballast
  - e. All of the Above
4. 1 KW =
  - a. 1 W
  - b. 10 W
  - c. 100 W
  - d. 10000 W
  - e. 1000 W
5. 1 KVA =
  - a. 1000 VA
  - b. 1 VA
  - c. 10 VA
  - d. 100 VA
  - e. 10000 VA
6. 1 Unit of Electricity consumption =
  - a. 1 W/h

- b. 10 W/h
  - c. 100 W/h
  - d. 10000 W/h
  - e. 1000 W/h
7. A 100 W Luminaire should have a Fuse of at least \_\_\_\_ Amps
- a. 1
  - b. 5
  - c. 10
  - d. 100
  - e. 25
8. The following are mandatory tools of each Assistant Streetlight Technician
- a. Pliers
  - b. Adjustable Wrench
  - c. Pipe Wrench
  - d. Drill
  - e. All of the Above
9. The following tools are not required by the Assistant Streetlight Technician
- a. Pliers
  - b. Adjustable Wrench
  - c. Shoe Laces
  - d. Drill
  - e. None of the Above

**F. Arrange by order of Occurrence**

1. The first electric street lights in Paris were installed on the avenue de l'Opera and the Place d'Etoile
2. The first commercial installation of streetlights in Los Angeles
3. First street to be lit by an incandescent light bulb in Newcastle upon Tyne
4. The first electric street lighting employed arc lamps were developed

**G. Arrange in ascending order of Luminous Efficacy**

1. Metal Halide Lamp
2. High pressure Sodium Vapour
3. Light Emitting Diode
4. High pressure Mercury Vapour

**H. Identify the true advantages of Street Lights**

- |                             |                               |                                |
|-----------------------------|-------------------------------|--------------------------------|
| 1. Prevent accidents        | True <input type="checkbox"/> | False <input type="checkbox"/> |
| 2. Increase safety          | True <input type="checkbox"/> | False <input type="checkbox"/> |
| 3. Help increase in robbery | True <input type="checkbox"/> | False <input type="checkbox"/> |



4. Pedestrians can walk better True  False
5. Hazard for motorists True  False

**I. Identify the advantages of Intelligent Street Light Systems**

1. Reduce energy consumption True  False
2. Sends information to control room via data network True  False
3. You cannot monitor performance of smart street light True  False
4. Reduce operational cost True  False
5. CCMS unit can record thefts and send alerts True  False
6. You cannot remote control on CCMS systems True  False

**J. Identify the correct Materials of which Streetlight Poles are made**

1. Steel True  False
2. Plastic True  False
3. Cement True  False
4. Wood True  False

**K. State Whether True or False**

1. Street lights prevent accidents and increase safety True  False
2. Pedestrian fatalities are 3 to 6.75 times more likely in the dark True  False
3. Street lighting reduces pedestrian crashes by approximately 5%. True  False
4. A pole can be located anywhere on the road True  False
5. A street light pole is required to be properly grounded True  False
6. Foundation for pole must be prepared as per design True  False
7. The dug up area can be covered with Dust and Malba True  False
8. All Luminaires for street lights should meet BIS Standards True  False
9. Wiring of any voltage can be used for street lights True  False
10. Grounding is required at each street light True  False
11. Every street light must have a cut-off fuse True  False

**L. Select the correct answer**

1. Good maintenance practices for street light maintenance include
- a) Replacing defective lamps, accessories, and wires
- b) Early rectification of cable faults and ensuring that cables are joined properly

- c) Regular maintenance of service cabinet/fuse box to avoid loose connections
- d) Regular cleaning of the luminaire cover to keep it free of dust/dirt
- e) All of the above

2. Regular cleaning of the luminaire cover to keep it free of dust/dirt leads to
- a) More energy consumption
  - b) Lesser Output
  - c) Lower Luminaire Life
  - d) Increased light output
  - e) None of the Above

3. By installing mechanical/electronic timers and/or daylight sensors for turning street lights on and off we can
- a) Energy Savings
  - b) Lower Lumens
  - c) Higher Power Consumption
  - d) Brighter Light During Daytime
  - e) All of the Above

4. Maintenance of street lighting systems covers and includes
- a) Mechanical maintenance of luminaries
  - b) Electrical maintenance of luminaries
  - c) Fault finding and repairs
  - d) General inspections
  - e) All of the Above

5. Streetlight Maintenance can be of the following types
- a) Reactive
  - b) Retroactive
  - c) Preventive
  - d) Both a) and c)
  - e) None of the Above

6. Periodic maintenance meetings must be scheduled with all the stakeholders to
- a) review performance of the street lighting installation, maintenance and repair program
  - b) review of performance of service providers
  - c) reporting of current progress against expected
  - d) discussion of issues/problems
  - e) All of the above

7. All street lighting maintenance activities must be logged in order to
- a) Monitor streetlight performance

- b) Trend failure and outage rates
- c) Understand when the workers completed the job
- d) a) and b)
- e) b) and c)

8. The primary concern of all technicians and supervisors handling streetlight and electrical equipments is

- a) Safety
- b) Next Holiday
- c) Lunch
- d) The latest Bollywood movie
- e) None of the Above

M

9. To carry out works safely, technicians must be equipped with

- a) Personal Protective Equipment (P.P.E.), which should include, but not be limited to helmet, safety shoes and fluorescent vests.
- b) Wooden or other insulated ladders
- c) Insulated tools
- d) insulated gloves
- e) All of the Above

10. Power supply to streetlights can typically be from:

- a) Overhead pole mounted transformer with fuse
- b) Underground pit with fuse
- c) Pillar box with fuse from an underground supply
- d) Street lighting column connection.
- e) All of the above

11. Switchboard inspection must include checks for

- a) Ingress of water and vermin
- b) Deterioration of weatherproof seals and other components
- c) Detection of poor connections and joints
- d) Correct earthing
- e) All of the above

12. Cable and Connection Inspection must include check for

- a) joints, connections and terminations for corrosion
- b) poor, loose, overheated or unsecured connections
- c) damaged insulation
- d) exposed conductors
- e) All of the above

13. The Lux Level for a very bright summer day is

- a) 1000 Lux
- b) 10000 Lux
- c) 100000 Lux
- d) 1000000 Lux
- e) None of the Above

14. The Lux Level at a floodlit cricket match is

- a) 16000 Lux
- b) 1600 Lux
- c) 160 Lux
- d) 16 Lux
- e) None of the Above

**M. Fill in the blanks with suitable answers from list of words provided.**

1. The fire extinguishers shall be tested for a satisfactory operation as per relevant Indian Standard at least ..... a year and record of such tests shall be maintained.
2. .... may occur due to falling of poles while stringing of conductor during erection of poles.
3. An electrical shock is received when electrical ..... passes through the body.
4. Use of ..... such as alcoholic beverages or narcotics should not be permitted on duty.
5. Any accident that occurs at the workplace should be immediately reported to all ..... concerned and within the stipulated time.

**Authorities; Accidents; Intoxicants; Current; Once**

**N. Choose the correct answer from the following options.**

1. Gear and kit for electrical worker includes:
  - (a) Hand gloves
  - (b) Ear protectors
  - (c) Wear protective clothing
  - (d) (a) and (c) only
  - (e) (a), (b) and (c)
2. Possible causes of accident are:
  - (a) Doing work in an unsafe way
  - (b) Improper loading or placement of equipment or supplies
  - (c) Diverting the attention of a worker from his work
  - (d) All of the above

3. While working in the field, safety can be created by:
  - (a) Checking the supply at streetlight poles
  - (b) Using good tools and equipments
  - (c) Using proper permits
  - (d) Using safety belt and waist belt
  - (e) All of the Above

**O. Match the elements of Group A with Group B**

Group A	Group B
1. Hand gloves	a. 
2. Eye protector	b. 
3. Foot protection	c. 
4. Welding mask	d. 

**P. Fill in the blanks with suitable answers from list of words provided**

1. Workplace ..... often reinforce and clarify standard operating procedure in a workplace.
2. A functional organizational structure is one of several ..... structures a company could implement.
3. If an employee wishes to raise a health and safety issue in a workplace, he should report it to the .....
4. The employees working on Streetlights should have adequate knowledge about all the various steps to be taken before undertaking ..... of streetlights including use of various safety equipment.
5. .... can be considered successful only when both the sender and the receiver understand the same information as a result of the communication.

**Communication; Reporting; Maintenance; Representative; Policies**

**Q. Choose the correct answer from the following options.**

1. Key elements of active listening are:
  - (a) Paying attention
  - (b) Be alert
  - (c) Provide feedback
  - (d) None
  - (e) All of the above

2. Physical barriers of effective communication are:
  - (a) Location
  - (b) Distance
  - (c) Workplace environment
  - (d) (b) and (c)
  - (e) (a) (b) and (c)
3. Interpersonal skills includes:
  - (a) Effective communication
  - (b) Positive attitude
  - (c) (a) and (b)
  - (d) Creating conflict

**R. Match the elements of Group A with Group B**

<b>Group A</b>	<b>Group B</b>
1. Positive attitude	a. It is an inherent part of life
2. Motivation	b. Learn to forgive
3. Emotional security	c. Aligning the interests of employees
4. Change	d. Opinion of yourself and your feelings

**SECTION II – Viva**

1. Explain the difference between Parallel and Series Circuits?
2. What is CRI or Color Rendering Index? What does CRI tell us about the luminaire?
3. Explain the technology used for LED Bulbs/Streetlights and the various parts of an LED luminaire.
4. Compare the efficiency of Incandescent, CFL and LED lamp – in terms of Electrical Power Consumption, Light Output, Luminous Efficacy, CRI and Lifespan.
5. Explain the term Color Temperature
6. What is the designing principle of road lighting?
7. Advantages and disadvantages of LED lighting.
8. Give a brief overview of the Street Light national program.
9. What are the duties and responsibilities of a Supervisor?
10. How many types of streetlight poles are there?
11. What are Junction Boxes and why are they important to streetlight installation?
12. Explain the process of trenching or embedment.
13. How are foundations of streetlight poles set up?
14. Which type of poles do not require foundations?
15. What is a fuse? What size of fuses are applicable to different wattages of streetlights?
16. What is grounding?
17. How and why is grounding important?

18. How do you ensure grounding is maintained for all fixtures?
19. List the most important tools of your trade.
20. What is a CCMS?
21. What are the major functions of a CCMS?
22. What is Preventive Maintenance?
23. What is Reactive maintenance?
24. How many types of maintenance programs are there?
25. What permits are necessary before any installation or maintenance is carried out on any location?
26. Under what conditions would you want to replace a streetlight?
27. How do you ensure or what steps would you take to ensure that a streetlight performs at its best at any given time?
28. What are the main causes of accidents in the workplace?
29. How do you prevent accidents in the workplace?
30. How many types of extinguishers are there?
31. How do you ensure effective communication in the workplace?
32. How would you ensure good interpersonal relations with all colleagues in a team or organization?

### SECTION III – Practical

1. Practically demonstrate how to do wiring of a Streetlight Fixture
2. Change a faulty driver of the given streetlight.
3. How do you do the connection of a streetlight with an overhead power source
4. How do you do the connection of a streetlight with an underground power source
5. Replacement a faulty connector in the fixture
6. Change the fuse of the fixture
7. Replace the MCB on the lighting fixture
8. Change the SPD (Surge Protection Device) on the fixture
9. Carry out an inspection of the streetlight pole
10. Carry out an inspection of the streetlight fixture
11. Check and measure the earthing of the pole and fixture
12. Carry out an inspection of the junction box
13. Should be able to troubleshoot the fault w.r.t. to street lighting network and cable faults.
14. Show the correct way to wear the full set of Personal Protective Equipment
15. Show the correct way to ensure safety on a sky lift/boom van/crane/hydraulic lift
16. Show the correct use of a Fire Extinguisher.
17. Show the correct method of CPR or Artificial Respiration on an injured colleague