

WRITE SHORT NOTES:

1) **Why earthing is necessary for any electrical equipments, domestic installation & service building etc?**

Ans: To drain away any leakage of currents due to poor insulation and to save human life from dangerous shock and also to avoid burnt of electrical equipment.

2) **What are Different type of earth conductor and sizes?**

Ans: a) Copper plate electrode Minimum 60 cm X 60 cm X 3.15 mm
b) Galvanized iron & steel plate electrode 60 cm X 60 cm X 6.3 mm
c) G.I. Pipe electrode internal diameter 50 mm and length 2.5 Mtrs

3) **Action to be taken if the resistance to earth of earth electrode is high?**

Ans: Earth resistance depends upon soil conductivity. To reduce earth resistance dig around the earth electrode, clean all the rust around earth plate or pipe. Sprinkle the common salt dissolved water in the pit and pack it up with powdered coke & salt. If it is not possible provide additional earths and connects all the earth points in parallel by solid jumper connections.

4) **What happens if electrical connection or electrical joint is loose?**

Ans: due to loose connection at joints resistance at that point will increase thereby the I^2R losses are more and develops heat. The total wiring may burn.

5) **Explain how to use Fire extinguisher practically?**

Ans: a) Pull the pin at the top of the extinguisher.
b) Aim the nozzle towards the base of the fire.
c) Stand approximately 8 feet away from the fire and squeeze the handle to discharge the extinguisher.
d) Sweep the nozzle back and forth at the base of the fire.

6) **What are the precautions to be taken before starting work on electrical installations?**

Ans: Before starting any electrical works on installations disconnect the power supply to the Electrical equipment and discharge & connect earth. Test with meters for any availability of supply then start the work.

7) **Function of circuit – breaker, difference between 'isolator' and circuit breaker?**

Ans: The function of circuit breaker is to break the electrical continuity in the event of faults duly isolating the faulty part. Isolator is switching device, which operates in OFF load only. Circuit Breaker is switching device, which can operate in, OFF or ON load.

8) **If a feeder circuit-breaker trips, what action is required?**

Ans: First isolate the faulty feeder check the faulty area on which fault the breaker was tripped (short circuit, open circuit and earth fault) after attending the faults test for its continuity and take insulation resistance of the feeder by using megger. And take the feeder into circuit.

9) **Different types of low-tension fuses and high-tension fuses?**

Ans: There are two types of fuses they are
a) L.V Fuses - 1) Semi enclosed re-wirable fuses
- 2) HRC cartridge fuses.

- b) H.V Fuses - 1) High voltage HRC fuses
- 2) Liquid type

10) Precautions to be taken in carrying out repairs on LT and HT switch gear?

Ans: The following precautions to be taken in carrying out repairs on LT & HT switch gears.

- a) Disconnect the power supply.
- b) Discharge the lines by connecting earth.
- c) Short the three phases with chain
- d) Start the work to carryout the repairs.

11) How do you measure the insulation resistance of transformer and what is the minimum value?

Ans; The insulation resistance of the transformer can be measured by using Megger and the minimum value of insulation resistance is 50 mega Ohm's.

12) Conditions for connecting two transformers in parallel?

Ans:

- a) Per unit impedance should be same
- b) Voltage rating should be same
- c) Phase sequence should be same.

13) What is the function of CT & P.T and where they are used?

Ans: The full form of CT is Current transformer and is used for measuring of current. The full form of PT is Potential transformer and is used to measure voltage.

14) Explain how to replace the HT Fuse on a 4-pole or 6-pole structure?

Ans:

- a) Open switch on 4-pole or 6-pole.
- b) Connect the discharge rod between conductor and earth.
- c) Replace the blown HT fuse.

15) What is the safety items kept in Sub-Station?

Ans:

- a) Discharge rod
- b) Pair of gloves
- c) Sand buckets
- d) Fire extinguishers.
- e) Safety belts and helmets
- f) 3 phase shortening chains

16) What are the Duties of Sub-Station Operator?

Ans: Sub station operator is responsible for proper and safe operation of all electrical equipments in sub-station. He should write the hourly reading in log book. He should note any unusual occurrences. He should able to operate fire extinguisher in case of emergency. He should keep all tools, safety belts, testing equipments, etc., in good condition.

17) Describe procedure to take shut down and to test the power line before starting work?

Ans: Study the circuit and identify the circuit breaker to be opened. Open and lock the circuit breaker and keep the key in personnel custody. Disconnect neutral link if available. Hang "Man at Work" notice board on the circuit breaker. Test for supply after making sure that, the testing device itself is OK at the equipment or line. Start the work.

18) What are the types of Motors?

Ans: According the current there are two types of motors

- a) AC motors - 1) single-phase AC motors
- 2) 3-phase AC motors.
- b) DC motors - 1) shunt motors
- 2) Series motors
- 3) Compound motors.

19) What are the different types of starters?

- Ans; a) DOL starter
b) Star - Delta starter
c) Auto transformer starter
d) Rheo-static starter

20) How do you change the direction of rotation of a D.C. motor?

Ans: The direction of rotation of DC motor can be changed either by changing the field winding connections or by changing the armature winding connection.

21) Cause of sparking at the brushes of a DC Motor?

Ans: Sparking at the brushes may be occur due to poor quality of carbon brushes, poor armature, loose connection of carbon brush holder and loose spring tension.

22) How do you change the direction of rotation of 1 ϕ AC motor & 3 ϕ AC motor?

Ans: The direction of rotation of single-phase AC motor is changed by changing the capacitor connections from starting winding to running winding and vice versa. The direction of rotation of three-phase AC motor is changed by changing the phase sequence of three-phase supply.

23) If a single phase motor fails to start or run slow what action to be taken.

Ans: If it is not starting check the supply and test the winding if it found normal check capacitor.

24) Will a three-phase motor continue to run even if the fuse on one-phase is blown?

Ans: Yes it will be run but the motor will be getting heated up and chances of motor winding may be burnt.

25) During run if a motor is getting unduly hot, what should be the reason?

Ans: The motor may be overloaded or bearing may be defective.

26) What is a CLS panel? Briefly explain its functioning?

Ans: A CLS (Colour Light Signaling) panel is a power control unit which primarily extends the power supply to signaling system. The CLS panel is provided in Electrified section of Railway line, where power supply from 25KV OHE which is most reliable is tapped and stepped down by auxiliary transformers to 230V AC single phase. The power supply thus obtained from UP/DN OHE lines and also the local power supply is fed to CLS panel, which automatically/manually senses the healthy power and feeds to the signaling system.

27) What is power factor? List the disadvantages of lower power factor? How to improve power factor? Mention the formula for required KVAR to improve power factor?

Ans: The ratio of useful power (KW) to apparent power (KVA) is termed as power factor. The power factor indicates the portion of the current in the system performing useful work. The power factor of Unity denotes 100% utilization of the total current.

The disadvantages of lower power factors are:

- (i) Over loading of cables & transformers.
- (ii) Drop in voltage at load points.
- (iii) In-efficient operation of plants and
- (iv) Attraction of penalty from power supplies companies.

The best way of improving power factor by installing suitable rating static power capacitors preferably at load points.

$$\text{kVAR} = \text{kW} (\tan\phi_1 - \tan\phi_2)$$

28) What is the objective of Indian Electricity Act-2013?

Ans: The main objectives of Indian Electricity Act-2013 are:

- (i) To consolidate the laws relating to generation, transmission, distribution, trading and use of electricity.
- (ii) Taking measures to conducive to development of electric industry and promoting competition. Therein, protecting interests of consumers including supply of electricity to all areas.
- (iii) Rationalization of electricity tariff, ensuring transparent policies regarding subsidies.
- (iv) Promotion of efficient and environmentally being policies.
- (v) Constitution of central electricity authority regulatory commission and establishment of appellate tribunal.

29) What are the illumination levels to be maintained at A1, A & B stations?

Ans:

| S.No | Location | Approved Lux Levels for different category of stations | |
|------|---------------------------------|--|-----|
| | | A1/A | B/C |
| | Category of Station | | |
| 1 | Concourse | 150 | 100 |
| 2 | Circulating Area | 50 | 30 |
| 3 | Waiting Hall | 150 | 100 |
| 4 | Retiring Room | 100 | 100 |
| 5 | Platform | | |
| | a. Open | 50 | 30 |
| | b. Covered | 150 | 100 |
| 6 | Enquiry cum Reservation office. | | |
| | a. General | 150 | 100 |
| | b. Counter | 150 | 150 |
| 7 | Covered Passenger Way | | |
| | a. Corridors | 50 | 50 |
| | b.FOB | 50 | 50 |
| | c. Stairs | 50 | 50 |
| 8 | Parcel/luggage office | | |
| | a. General | 100 | 100 |

| | | | |
|----|--|-----|-----|
| | b. Counter | 150 | 150 |
| 9 | Timer Table | 200 | 200 |
| 10 | Outdoor car parking | 50 | 30 |
| 11 | Restaurant Area | | |
| | a. Kitchen | 200 | 150 |
| | b. Stores | 150 | 100 |
| | c. Dining Hall | 200 | 150 |
| 12 | Other Service building at Station | 200 | 200 |
| 13 | Cloak Room | | |
| | a. General | 100 | 100 |
| | b. Counter | 150 | 150 |
| 14 | Public Utility Services (Toilet/Bathroom) | 100 | 75 |

30) What are the essential equipments to be maintained in ART & MRV?

Ans: Electrical equipments in ART/MRV available as per Railway Board's Lr. No.99/Elec/G/113/1, dtd.16-07-03.

| S. No. | Equipment | Proposed to be Modified | |
|--------|--|---------------------------|--------------------|
| | | ARTs (Class A/Class B) | ARMEs (class C) |
| 1 | Diesel generating set of 15 KVA 230 V Capacity * | 1 Set | -- |
| 2 | Generator set Kerosene driven 1.5 KVA 230 V. | 20Sets | 2 sets |
| 3 | Complete luminar fitting with 1000 W Halogen lamps and control gear | 10Sets | 2 sets |
| 4 | Complete luminar fitting with 150 W Metal Halide lamp and control gear | 40Sets | 10 sets |
| 5 | Telescopic stand 2 Mts high for mounting luminars for Halogen/MH fittings. | 20 Nos | -- |
| 6 | PVC insulated and PVC sheathed 3 Core flexible cables 23/0.193 mm 15 m long with 15 weather proof IC pin for weather proof I.C. socket. | 50 nos | 12 nos |
| 7 | PVC insulated and PVC sheathed 3 Core flexible cable 23/0.193 mm | 1500 mtrs | 300 mtrs |
| 8 | K. Oil in 200 Lts capacity drums. | 3 nos | 1 no |
| 9 | Diesel oil in 200 Lts drums | 1 no | -- |
| 10 | Polythene containers 20 Lts capacity for handling kerosene and pouring into auxiliary tanks of engine | 18 nos | 4 nos |
| 11 | Lubricating Oil | 40 ltrs | 5 ltrs |
| 12 | Oil measuring can 1 Litre capacity | 6 nos | 1 no |
| 13 | Insulation tape PVC in rolls of 10 mts. | 24 nos | 6 nos |
| 14 | Tool set comprising of 1 no. cutting plier (254 mm), 3 no's of screw driver (round of 300 mm, 150 mm & 100 mm), 1 no. Knife and 1 no. hammer DP. | 1 set | 1 set |
| 15 | Spanner DE 3m to 19mm in steps of 1.5mm | 1 set | 1 set |
| 16 | Socket spanner with lever 3 mm to 19 mm | 1 set | 1 set |
| 17 | Aluminum telescopic ladder | 2 nos | -- |

| | | | |
|----|--|--------|-------|
| 18 | Earthing rod for earthing OHE ** | 2 nos | -- |
| 19 | Portable switch board with water proof sockets each capable of taking 500 watt load (2 sockets of 5 Amps and 2 combination sockets of 5/15 amps) | 4 sets | 1 set |
| 20 | Drum of fixed stand for main cable | 2 nos | -- |
| 21 | Battery charger 230 V AC/110 DC , 60 Amps | 2 nos | -- |
| 22 | 100 W Gas filled bulbs bayonet type along with holder in wire cage and with handle and hook | 6 nos | 4 nos |
| 23 | Telescopic masts 6 meters high | 4 nos | 2 nos |

Note: - To avoid premature replacement of existing 6 KVA D.G. set, the existing 6KVA DG set should only be replaced by 15 KVA D.G. set when it is due for replacement.

All new ART's shall be equipped with 15 KVA D.G. set.

** To be provided on Electrified Section only.

31) What are the precautions to be taken while working in RE area?

Ans: No one shall attempt to work on any overhead line running alongside the electrified tracks without taking special precautions of earthing on both sides of the work. Minimum 2m electrical clearance from live OHE of the adjacent track or any other equipment nearby must be maintained. During foggy/cloudy weather conditions, wear safety shoes, insulated rubber gloves and tools with insulated handles should be used to protect from induction effect. Steel tape or metallic tape or tape with woven metal reinforcement should not be used. Always carry the ladders/lengthy items in horizontal position instead of vertical. While attending to platform lights (in COP/OPEN area), the ladders shall be properly secured to avoid accidental fall in OHE.

- 32) What are the factors to be taken into consideration while selecting a pump for a particular location/purpose?
- 33) What are the changes taken place to DISCOM billing system recently?
- 34) What are the factors/items to be checked in DISCOM bill to reduce the billing amount? What are suggestions/remedies you propose to reduce billing amount?
- 35) Mentioned 2 types of renewable Energy Sources as alternatives to DISCOM Power supply?
- 36) What are the major parts in Solar Lighting Systems?
- 37) Mentioned few Energy Conservation Measures in water pumping system?
- 38) What Energy Auditing? What are the advantages in conducting Energy Auditing?
- 39) What is the purpose of EOCR in pump starter? What are the factors to be taken into consideration to select range of EOCR?
- 40) What are the probable reasons for failure/burning of submersible pumps?
- Or
- What are the items to be checked to find out the reasons for any pump burning?
- 41) What are the items to be checked and maintained in LC Gates before GM's Annual Inspection?