

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-7 SEMESTER – OLD PAPER – S22 TO S25 – QUESTION BANK

Subject Name & Code:

Industrial Electrical Systems- 3170920

Unit 1: Electrical System Components

Repeated Questions:

1. **Define/Explain MCB, ELCB, and MPCB.**
 - Appeared in: S22 (Q4a, 03 marks), W22 (Q4a, 03 marks), W23 (Q4a, 03 marks), S23 (Q2a, 03 marks), S25 (Q1b, 04 marks)
2. **What is a role of single line diagram (SLD) in electrical circuits?**
 - Appeared in: S24 (Q2a, 03 marks), S25 (Q1a, 03 marks)
3. **List/Explain electrical safety practices / Define electric shock and explain safety practices.**
 - Appeared in: S24 (Q2b, 04 marks), W23 (Q4a, 03 marks), W24 (Q1c, 07 marks)
4. **Compare MCB and ELCB.**
 - Appeared in: S24 (Q4b, 04 marks), S23 (Q2a, 03 marks)

Other Important Questions:

1. **Explain the protective devices and their importance in residential wiring system.**
 - Appeared in: S24 (Q1b, 04 marks)
2. **State the need of Contactor, Isolator, and protective Relays.**
 - Appeared in: W22 (Q2a, 03 marks)
3. **Explain MPCB with its Function and working. Also compare MPCB with MCCB.**
 - Appeared in: S23 (Q2c, 07 marks)
4. **Desirable characteristics of fuse elements.**
 - Appeared in: S23 (Q1a, 03 marks)
5. **Explain loop-in-system of energy distribution and state its advantages and disadvantages.**
 - Appeared in: S23 (Q1b, 04 marks)
6. **Illustrate single line diagram (SLD) of wiring system.**
 - Appeared in: W22 (Q1c, 07 marks)
7. **Explain SLD with example.**

- Appeared in: W23 (Q5b, 04 marks)

8. Explain the working of Isolator and circuit breaker.

- Appeared in: W23 (Q5a, 03 marks)

9. How the Relay works? Explain in brief.

- Appeared in: W23 (Q5a, 03 marks)

10. Explain devices used for protection against lightning.

- Appeared in: W24 (Q1b, 04 marks)

11. Explain panel metering and its types.

- Appeared in: W24 (Q5b, 04 marks)

12. Explain criteria for arrangement of apparatus on switch boards.

- Appeared in: W24 (Q5a, 03 marks)

Unit 2: Residential and Commercial Electrical Systems

Repeated Questions:

1. **State/Explain/List the general rules for residential (and commercial) wiring/installation.**
 - Appeared in: S24 (Q1c, 07 marks), W22 (Q1a, 03 marks), S22 (Q3a, 03 marks), S23 (Q1c, 07 marks), W23 (Q1b, 04 marks), S25 (Q1c, 07 marks), W24 (Q2b, 04 marks)
2. **Explain/Discuss the method of load calculation and sizing of the wire.**
 - Appeared in: S24 (Q2c, 07 marks), W23 (Q3b, 07 marks), S25 (Q2c, 07 marks), W24 (Q2c-OR, 07 marks)
3. **Explain the electrical earthing system for a residential building / Analyze earthing of commercial installation.**
 - Appeared in: S24 (Q2c-OR, 07 marks), W22 (Q4b, 04 marks), W23 (Q3b, 04 marks), S25 (Q2c-OR, 07 marks), W24 (Q2c, 07 marks)
4. **Explain different types of electrical wiring system.**
 - Appeared in: S22 (Q1b, 04 marks), W23 (Q1c, 07 marks)
5. **Explain requirements of commercial Installation.**
 - Appeared in: W22 (Q1b, 04 marks), S22 (Q2a, 03 marks)

Other Important Questions:

1. **How many types of tariff structures is used for residential connection? / Explain Tariff Structure. / What is tariff? Explain factors affecting tariff.**
 - Appeared in: S24 (Q1a, 03 marks), S22 (Q1a, 03 marks), S23 (Q2c-OR, 07 marks), S25 (Q2a, 03 marks), W24 (Q1a, 03 marks)
2. **Discuss the factors affecting the selection of wiring for Residential.**
 - Appeared in: W23 (Q1a, 03 marks)
3. **Explain design of earthing.**
 - Appeared in: W23 (Q3b, 04 marks), S22 (Q4b, 04 marks)
4. **What are the key considerations in the selection process of an ELCB's rating for industrial applications? / Describe selection procedure of ELCB for industrial dwelling.**
 - Appeared in: S25 (Q2b, 04 marks), S22 (Q5b, 04 marks), W22 (Q5b, 04 marks)
5. **Explain conduit system of wiring in detail.**
 - Appeared in: S23 (Q2b, 04 marks)
6. **Explain concept of Industrial load and wiring used in an industry.**
 - Appeared in: W24 (Q3c-OR, 07 marks)
7. **Analyze with an example rating of main switch for residential wiring system.**
 - Appeared in: W23 (Q3b, 07 marks)

Unit 3: Illumination Systems

Repeated Questions:

1. **Define the following terms: Lumen, Candle Power, Luminous Intensity, Glare, Space-height ratio, Lamp efficiency, Waste light factor, Utilization factor, etc.**
 - Appeared in: S24 (Q3a, 03 marks & Q3a-OR, 03 marks), W22 (Q3a, 03 marks & Q3a-OR, 03 marks), S22 (Q3a, 03 marks), S23 (Q3a, 03 marks & Q3a-OR, 03 marks), W24 (Q3b, 04 marks)
2. **Explain Construction and working of compact fluorescent light (CFL).**
 - Appeared in: W22 (Q3c-OR, 07 marks), W23 (Q3c, 07 marks), S22 (Q3c-OR, 07 marks), W24 (Q4b, 04 marks)
3. **Explain/Discuss the operation of LED lamp / CFL as energy efficient lamp. / Explain energy saving in illumination systems.**
 - Appeared in: S24 (Q3c, 07 marks), W23 (Q3c, 04 marks), S22 (Q3b, 04 marks), W24 (Q4a, 03 marks)
4. **Explain the various lighting schemes / Different types of lighting scheme.**
 - Appeared in: W22 (Q3c, 07 marks), S22 (Q2b, 04 marks), S23 (Q3c-OR, 07 marks), S25 (Q3c-OR, 07 marks)

Other Important Questions:

1. **Design the adequate lighting scheme for the reading hall. / Explain design of lighting scheme for a residential application.**
 - Appeared in: S24 (Q3b-OR, 04 marks), W24 (Q4a, 03 marks)
2. **Explain factors for deciding lighting scheme installations.**
 - Appeared in: W24 (Q2a, 03 marks)
3. **Write a technical note on: Incandescent Lamp.**
 - Appeared in: W24 (Q3b-OR, 04 marks)
4. **Write a technical note on: Flood lighting.**
 - Appeared in: W24 (Q4b, 04 marks)
5. **Explain about waste light factor.**
 - Appeared in: S22 (Q4b, 04 marks)
6. **Define: M.H.C.P., M.S.C.P. and M.H.S.C.P.**
 - Appeared in: S24 (Q3a-OR, 03 marks), S23 (Q3a, 03 marks)

Numerical Problems:

1. **Calculate the brightness (or luminance) of snow under an illumination of (a) 44,000 lux and (b) 0.22 lux. Assume that snow behaves like a perfect diffuser having a reflection factor of 85 per cent.**
 - Appeared in: S24 (Q3b, 04 marks)

2. **A lamp giving out 1200 lumen in all directions is suspended 8 m above the working plane. Calculate the illumination at a point on the working plane 6 m away from the foot of the lamp.**
 - Appeared in: S24 (Q3c-OR, 04 marks)
3. **A room with an area of 6×9 m is illustrated by ten 40-W lamps. The luminous efficiency of the lamp is 100 lumens/W and the coefficient of utilization is 0.65. Find the average illumination.**
 - Appeared in: W22 (Q3b, 04 marks)
4. **The flux emitted by 100-W lamp is 1,400 lumens placed in a frosted globe of 40 cm diameter and gives uniform brightness of 250 milli-lumens/m² in all directions. Calculate the candle power of the globe and the percentage of light absorbed by the globe.**
 - Appeared in: W22 (Q3b-OR, 04 marks)
5. **A 200-V lamp takes a current of 1.2 A, it produces a total flux of 2,860 lumens. Calculate: (i) The MSCP of the lamp and (ii) The efficiency of the lamp.**
 - Appeared in: S23 (Q3b, 04 marks), S25 (Q3b-OR, 04 marks)
6. **Calculate the average intensity of illumination on the surface, which is inclined at an angle of 30°, it is kept at a distance of 8 m from a 1000 candela power lamp.**
 - Appeared in: S23 (Q3b-OR, 04 marks)
7. **The illumination at a point on a working plane directly below the lamp is to be 60 lumens/m². The lamp gives 130 CP uniformly below the horizontal plane. Determine: (i) The height at which lamp is suspended (ii) The illumination at a point on the working plane 2.8 m away from the vertical axis of the lamp.**
 - Appeared in: S25 (Q3c, 07 marks)
8. **Explain method for calculating number of lamps with a simple example.**
 - Appeared in: W24 (Q5a-OR, 03 marks)

Unit 4: Industrial Electrical Systems

Repeated Questions:

1. **What are the effects of poor power factor on distribution system? / What are the disadvantages of low power factor?**
 - Appeared in: S24 (Q4a, 03 marks), W23 (Q5c, 07 marks)
2. **Explain the importance of power factor improvement and its methods. / Discuss various methods to improve it.**
 - Appeared in: S24 (Q4c-OR, 07 marks), S23 (Q4c-OR, 07 marks), W24 (Q4c, 07 marks)
3. **List out different types of UPS and its application. / Summarize the different types of UPS and their specific applications.**
 - Appeared in: S24 (Q4a-OR, 03 marks), W22 (Q5a, 03 marks), S22 (Q5a, 03 marks), S23 (Q4b, 04 marks), S25 (Q4a-OR, 03 marks)
4. **List out steps for selections of transformer. / Discuss the factor of transformer selections.**
 - Appeared in: S24 (Q4b-OR, 04 marks), W22 (Q5a, 03 marks), S22 (Q5a, 03 marks), S23 (Q5b, 04 marks), S25 (Q4b-OR, 04 marks)
5. **Distinguish between LT and HT Motor? Analyze with an example.**
 - Appeared in: W22 (Q4b, 04 marks), S22 (Q5c, 07 marks), S23 (Q4c, 07 marks), S25 (Q4b, 04 marks)
6. **Discuss the essential protective components of industrial substations.**
 - Appeared in: S24 (Q4c, 07 marks), S25 (Q4c, 07 marks)

Other Important Questions:

1. **Compare the continuous power, prime power and standby power related with standby generator.**
 - Appeared in: W22 (Q5c, 07 marks), S22 (Q4c, 07 marks), S25 (Q4c-OR, 07 marks)
2. **Explain Industrial loads. / Classify and explain industrial loads.**
 - Appeared in: S22 (Q4a, 03 marks), W24 (Q3a, 03 marks)
3. **Explain need of Lightning Protection system.**
 - Appeared in: S23 (Q4a, 03 marks), S22 (Q2c-OR, 07 marks)
4. **Explain importance of Earthing.**
 - Appeared in: S23 (Q4a, 03 marks)
5. **Name the factors that should be taken care of while designing and erecting a substation. / Make list of the factors included in substation designing.**
 - Appeared in: S23 (Q4b, 04 marks), S25 (Q5b, 04 marks)
6. **Compare PCC and MCC panels.**
 - Appeared in: W23 (Q2c, 07 marks), S23 (Q5a-OR, 03 marks)

7. **Analyze the needs of DG system with advantages & disadvantages. / Essentialness of Diesel Generator (DG) system.**
 - Appeared in: W22 (Q5c, 07 marks), S25 (Q5c, 07 marks)
8. **Explain electrical systems for the elevators. / Write short notes on Electrical Systems for the elevators.**
 - Appeared in: S24 (Q5b, 04 marks), W22 (Q2b, 04 marks), S22 (Q3c, 07 marks), W23 (Q4b, 04 marks), S23 (Q5a, 03 marks)
9. **Classify electric elevators.**
 - Appeared in: W22 (Q2b, 04 marks), S22 (Q3b, 04 marks)
10. **Explain different parts of Elevator.**
 - Appeared in: W24 (Q3a-OR, 03 marks)
11. **State the requirements of elevator motors. State with reason best suitable motors for elevators.**
 - Appeared in: W24 (Q4c, 07 marks)

Numerical Problems:

1. **The monthly readings of a consumer's meter are as follows: Maximum demand = 50 kW, Energy consumed = 36,000 kWh, Reactive energy = 23,400 kVAR. If the tariff is Rs 80 per kW of maximum demand plus 8 paise per unit plus 0-5 paise per unit for each 1% of power factor below 86%, calculate the monthly bill of the consumer.**
 - Appeared in: W22 (Q4c, 07 marks)
2. **A synchronous motor improves the power factor of a 300kW load from 0.7 lagging to unity power factor and simultaneously the motor carries a load of 100 kW. Calculate the power factor at which the motor operates.**
 - Appeared in: S24 (Q5c, 07 marks)
3. **A supply system feeds the following load...(Complex Power Factor problem).**
 - Appeared in: W22 (Q4c-OR, 07 marks) *[Incomplete in paper, but practice kVAR calculation and PF improvement problems.]*

Unit 5: Industrial Electrical System Automation

Repeated Questions:

1. **Draw the block diagram of PLC. / Develop a block diagram of PLC with basic components and its Functions.**
 - Appeared in: S24 (Q5a, 03 marks), W22 (Q2c-OR, 07 marks), S22 (Q1c, 07 marks), S23 (Q5b, 04 marks), S25 (Q5a, 03 marks), W24 (Q5c, 07 marks)
2. **Write short note on SCADA system for distribution automations. / Build architecture of SCADA system with neat diagram.**
 - Appeared in: S24 (Q5c, 07 marks), W22 (Q2c, 07 marks), S22 (Q2c, 07 marks), S23 (Q5c, 07 marks), S25 (Q5c, 07 marks), W24 (Q5c-OR, 07 marks)
3. **Explain the advantages of process automations.**
 - Appeared in: S24 (Q5a-OR, 03 marks), S23 (Q5c, 07 marks), S25 (Q5a, 03 marks), W24 (Q5b, 04 marks)

Other Important Questions:

1. **Explain the PLC based speed control system of electrical motor.**
 - Appeared in: S24 (Q5b-OR, 04 marks), S25 (Q5b, 04 marks)
2. **Explain in brief role of automation.**
 - Appeared in: S22 (Q5c, 07 marks)
3. **Define: industrial automation. State its need and importance.**
 - Appeared in: S23 (Q5c-OR, 07 marks)
4. **Sketch a block diagram of PLC with basic components and its Functions.**
 - Appeared in: W22 (Q2c-OR, 07 marks)
