

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Second Semester

Industrial Safety Engineering

24PISPC203 - ELECTRICAL SAFETY

Regulations - 2024

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. The abbreviation CPR stands for: (a) Current Protection Relay (b) Cardio Pulmonary Resuscitation (c) Circuit Power Regulation (d) Controlled Power Restoration	1	K1	CO1
2. The purpose of the Indian Electricity Act is to: (a) Increase power production (b) Regulate electrical safety and standards in India (c) Provide tariffs for consumers (d) Improve energy storage devices	1	K2	CO1
3. Which protection device is most suitable for preventing short-circuit faults? (a) MCB (b) Transformer (c) Capacitor (d) AVR	1	K1	CO2
4. Corona effect occurs mainly in: (a) Underground cables (b) Low-voltage motors (c) High-voltage overhead lines (d) Batteries	1	K2	CO2
5. Overvoltage protection is needed to: (a) Reduce cable size (b) Protect devices from insulation breakdown (c) Increase power output (d) Prevent earthing	1	K2	CO3
6. Between ELCB and MCB, which offers better shock protection? (a) ELCB (b) MCB (c) Both same (d) None	1	K1	CO3
7. Why are environmental conditions considered during equipment selection? (a) To reduce paperwork (b) To match equipment to operating conditions (c) To increase cost (d) To reduce safety	1	K2	CO4
8. Safety in portable tools mainly depends on: (a) Tool weight (b) Proper insulation and grounding (c) Color of tool (d) The brand name	1	K2	CO4
9. Hazardous Zone 0 refers to: (a) Area where explosive gas is present occasionally (b) Area where explosive gas is present continuously (c) Area where explosive gas is never present (d) Area safe for all electrical equipment	1	K1	CO5
10. For preventing cable faults in hazardous zones, the best design practice is: (a) Using PVC cables (b) Using armored, shielded, and temperature-rated cables (c) Using household-grade cables (d) Using single-core flexible wire	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Why stored energy is dangerous in electrical equipment even after power is switched off?	2	K2	CO1
12. How would you identify electrical equipment compliance with Indian electricity rules?	2	K2	CO1
13. What is meant by energy leakage in electrical systems?	2	K1	CO2
14. Why do sparks occur when plugging in devices? Explain the mechanism.	2	K2	CO2
15. Distinguish between overvoltage and under voltage protection.	2	K2	CO3
16. What steps would you take to safely handle a handheld electrical tool?	2	K2	CO3

- | | | | |
|--|---|----|-----|
| 17. Define interlock in electrical safety. | 2 | K1 | CO4 |
| 18. Compare fuse and circuit breaker. | 2 | K2 | CO4 |
| 19. What is meant by intrinsically safe equipment? | 2 | K1 | CO5 |
| 20. Name any two equipment certifying agencies. | 2 | K1 | CO5 |
| 21. Create a checklist for inspecting building wiring safety. | 2 | K2 | CO6 |
| 22. Recommend two selection criteria for temperature-classified equipment. | 2 | K2 | CO6 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

- | | | | |
|--|----|----|-----|
| 23. a) Describe the sources and effects of electromagnetic radiation in electrical environments. | 11 | K2 | CO1 |
| OR | | | |
| b) Discuss the role of first aid and CPR in reducing fatalities in electrical accidents. | 11 | K2 | CO1 |
| 24. a) Apply suitable safety procedures for handling high-voltage electrical equipment used in war/defense applications. | 11 | K3 | CO2 |
| OR | | | |
| b) Apply earthing requirements to design an earth pit with correct resistance value and material selection. | 11 | K3 | CO2 |
| 25. a) Analyze the effect of improper conductor joints on electrical installations. Discuss symptoms, risks, and prevention | 11 | K4 | CO3 |
| OR | | | |
| b) Analyze the differences between series and parallel fault conditions in cables. Explain the protective response required for both. | 11 | K4 | CO3 |
| 26. a) Critically evaluate the importance of self-diagnostic features in advanced electrical equipment. Discuss how they improve reliability, maintenance planning, and operator safety. | 11 | K5 | CO4 |
| OR | | | |
| b) Evaluate the use of discharge rods versus automatic discharge mechanisms in high-voltage installations. Judge their effectiveness, reliability, and safety implications. | 11 | K5 | CO4 |
| 27. a) Apply intrinsic safety design rules to create a safe system for a field transmitter in a Zone 0 area. Include wiring and barrier arrangement. | 11 | K3 | CO5 |
| OR | | | |
| b) Using a real-time scenario, demonstrate how isolators and Zener barriers ensure safety in hazardous instrumentation loops. | 11 | K3 | CO5 |
| 28. a) Develop a step-by-step installation and maintenance plan for a cable distribution system in an industrial plant. Include testing, documentation, and safety measures. | 11 | K6 | CO6 |
| OR | | | |
| b) Develop safety architecture for an automated gas-pipeline network, integrating hazardous-zone classification, detector placement, isolation methods, and fail-safe mechanisms. | 11 | K6 | CO6 |