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Question Paper Code : 91027

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

Fifth/Sixth/Seventh/Eighth Semester

Electrical and Electronics Engineering

EE 3036 — SUSTAINABLE AND ENVIRONMENTAL FRIENDLY HV
INSULATION SYSTEM

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a carbon footprint, and why is it important in assessing environmental impact?
2. Define global warming potential and its relevance in product and system design.
3. Why is SF₆ gas considered hazardous to the environment?
4. Mention two alternative green gaseous insulators to SF₆.
5. What are the hazardous effects of using traditional organic oils as liquid dielectric materials?
6. Name one environmentally friendly liquid dielectric material and mention one of its properties.
7. What are the environmental hazards associated with existing solid dielectric materials?
8. Name one alternate green solid dielectric material and mention one of its properties.
9. What are the key requirements for managing green insulation systems?
10. Mention one major application of green insulation systems and the standard it follows.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the concept of carbon footprint and its impact on global sustainability.

Or

- (b) Explain the global warming potential (GWP) of different gases and materials used in energy systems.
12. (a) Discuss the hazardous environmental effects of SF₆ gas in detail. What are the environmental consequences of its use, and what alternative gaseous insulators are being considered to replace it?

Or

- (b) Compare and contrast alternate green gaseous insulators with SF₆ gas. Explain the properties of these alternative gases and gaseous mixtures, focusing on their environmental benefits and performance.
13. (a) Describe the hazardous effects of traditional liquid dielectric materials like organic oils.

Or

- (b) Examine the properties and benefits of alternate green liquid insulators such as ester oil and vegetable oils.
14. (a) How do alternate green solid insulators offer a more sustainable solution? Explain in detail.

Or

- (b) Compare traditional solid dielectric materials with alternate green solid insulators. Provide examples of green solid insulators and their potential applications
15. (a) Discuss the evolving standards for the management, testing, and disposal of green insulation systems. How do these standards ensure the sustainability and efficiency of insulation materials in modern industries?

Or

- (b) Examine the major applications of green insulation systems in various industries.

PART C — ($1 \times 15 = 15$ marks)

16. (a) How do alternative green liquids, such as ester oils and vegetable oils, overcome the hazards? Discuss their properties, benefits, and environmental impact.

Or

- (b) Discuss in detail, the key properties, environmental benefits, and industrial applications of green solid insulators.
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