Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 80505

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Sixth Semester

Electrical and Electronics Engineering

EE 2353 — HIGH VOLTAGE ENGINEERING

(Regulations 2008)

(Common to PTEE 2353 – High Voltage Engineering for BE. (Part-Time)
Fifth Semester — Electrical and Electronics Engineering — Regulations 2009)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   State the sources which determine the wave shape of switching surges.

2.   Write down the causes of power frequency and its harmonic over voltages.

3.   What is meant by corona discharges?

4.   What are electronegative gases?

5.   What is the need for HVDC generation?

6.   What is a 'Trigatron gap' ? What are its function?

7.   Explain the basic principle of Hall generator.

8.   List some advantages of Faraday generator.

9.   What are called type tests?

10. What is BIL?

PART B — (5 × 16 = 80 marks)

11. (a) Explain briefly about power frequency over voltages in power systems. (16)

Or

(b) Show the charge distribution patterns in the cloud following Wilson's and Simpson's theories. (16)

12. (a) (i) Describe the various mechanisms of vacuum break down. (8)

(ii) What are treeing and trenching? Explain clearly the two processes in solid dielectrics. (8)

Or

(b) (i) Explain the various theories that explain break down in commercial liquid dielectrics. (8)

(ii) What is corona discharge? Explain clearly anode and cathode Coronas. (8)

13. (a) A Cockcroft-Walton type voltage multiplier has eight stages with capacitances equal to 0.05 μ F. The supply transformer secondary voltage is 125 kV at a frequency of 150 Hz. If the load current to be supplied is 5 mA, find : (16)

(i) the percentage ripple

(ii) the regulation and

(iii) the optimum number of stages for minimum regulation of voltage drop.

Or

(b) A six-stage impulse generator designed to generate the standard waveform (1.2/50 μ s) has a per stage capacitance of 0.06 μ F to be used to test transformers with an equivalent winding to earth capacitance of 1 nF. A peak output voltage of 550 kV is required for testing the transformer. The wavefront time is to be defined based on 30% and 90% values. With the aid of appropriate calculations select the values of the resistive elements in the circuit to produce the required waveform. State any assumptions made. (16)

14. (a) (i) Explain the operation of the hall effect generator for measuring high DC currents. (8)

(ii) Discuss the factors influencing the spark over voltage on Sphere gaps. (8)

Or

(b) Tabulate the various methods of High AC and DC voltage and current measurements. (16)

15. (a) With neat diagram, explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure?

(10 + 6)

Or

(b) What is meant by Insulation Coordination? Explain how the protective devices are chosen for optimum insulation level in a power system.

(4 + 12)

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