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Reg. No. :

Question Paper Code : 90497

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Seventh Semester

Electrical and Electronics Engineering

EE 8010 — POWER SYSTEMS TRANSIENTS

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Power system transients.
2. Classify the types of power system transients.
3. Draw the equivalent circuit of resistance switching.
4. Define Ferro resonance.
5. Write the significance of tower footing resistance.
6. Explore the necessity of insulation co-ordination.
7. What are the specifications of a travelling wave?
8. Define crest and front of a travelling wave.
9. Identify any two advantages of EMTP software packages.
10. Develop an expression for response and recovery voltage of a shorted line.

PART B — (5 × 13 = 65 marks)

11. (a) Examine the sources of transients. Also explain how transients affect the power systems. (5+8)

Or

- (b) Explain the importance of study of transients in power system planning for the future expansion.

12. (a) (i) Analyze in detail the resistance switching with suitable diagram. (6)
(ii) With neat sketch explain the concept of current chopping. (7)

Or

- (b) With neat sketch explain the capacitance switching with multiple restrikes.

13. (a) What are the two theories of charge formation in the clouds? Explain them in detail.

Or

- (b) Explain the mechanism of lightning discharge and concept of footing resistance.

14. (a) Draw the step response of a travelling wave. Explain it by using Bewley's lattice diagram.

Or

- (b) A long transmission line is energized by a unit step voltage 1.0 V at the sending end and is open circuited at the receiving end. Develop the bewley's lattice diagram and obtain the value of the voltage at the receiving end after a long time. Take the attenuation factor $\alpha = 0.8$

15. (a) Interpret the need for simulation studies. Also describe the key points of EMTP software and the steps involved to do a simulation study of a sample power system.

Or

- (b) Evaluate the reflection and transmission coefficient in an integrated power system.

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PART C — (1 × 15 = 15 marks)

16. (a) Obtain the transient current component $i(t)$ for RLC circuit with sine wave excitation.

Or

- (b) What is meant by current suppression? Explain the transients due to switching of an unloaded transformer with relevant wave forms.

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