Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 30574

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024

Fourth Semester

Electrical and Electronics Engineering

EE 8402 – TRANSMISSION AND DISTRIBUTION

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What is meant by transposition of power lines?

2.   What are the advantages of using bundle conductors?

3.   Define voltage regulation of transmission line.

4.   What is meant by medium transmission line?

5.   What is the use of vibration damper?

6.   List the various types of insulators.

7.   Define string efficiency.

8.   What are the various methods of grading?

9.   What are the disadvantages of Radial distribution systems?

10. Specify the features of FACTS.

PART B — (5 × 13 = 65 marks)

11. (a) Derive an expression for the inductance of a three-phase overhead line with unsymmetrical spacing.

Or

(b) A three phase 50Hz line consists of three conductors each of diameter 21 mm. The spacing between the conductors is as follows: A to B = 3m; B to C = 5 m; C to A = 3.6 m. Find the inductance and inductive reactance per phase per km of the line.

12. (a) Derive the expression for sending end voltage and current for a long transmission line using rigorous method.

Or

(b) Derive the expression for the performance of short transmission line. Draw its vector diagram.

13. (a) Derive an expression for sag in overhead lines when

    (i) Supports are at equal levels   (6)

    (ii) Supports are at unequal levels.   (7)

Or

(b) A transmission line has a span of 150 m between level supports. The conductor has a cross sectional area of 2 cm². The tension in the conductor is 2000 kg. If the specific gravity of the conductor material is 9.9 g/cm³ and wind pressure is 1.5 kg/m length, calculate the sag. What is the vertical sag?

14. (a) A single core cable of conductor diameter 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 kV, 3 phase system. Two intersheaths of diameter 3.1 cm and 4.2 cm are introduced between the core and lead sheath. If the maximum stress in the layers is the same, find the voltages on the intersheaths.

Or

(b) Explain the following methods of cable grading:

    (i) Capacitance Grading   (7)

    (ii) Intersheath Grading.   (6)

15. (a) Explain the various schemes of Distribution Systems, with the help of neat diagrams.

Or

(b) Describe the short notes on the following

   (i) EHVAC (7)

   (ii) HVDC (6)

PART C — (1 × 15 = 15 marks)

16. (a) A 100 km long 3 phase, 50 Hz transmission line has the following line constants:

Resistance/Phase/km = 0.1 Ω, Reactance/Phase/km = 0.5 Ω,

Susceptance/Phase/km = 10 × 10^{-6}Mho. If the line supplies load of 25 MW at 0.9 p.f. lagging at 66 kV at the receiving end, calculate by nominal π method

   (i) sending end power factor, (5)

   (ii) regulation and (5)

   (iii) transmission efficiency. (5)

Or

(b) In s 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth 12% of self-capacitance of each insulator, find

   (i) the distribution of voltage over 3 insulators and (7)

   (ii) string efficiency. (8)