

B.E. / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2011
ELECTRICAL & ELECTRONICS ENGINEERING BRANCH
FOURTH SEMESTER

EE 9251 – TRANSMISSION AND DISTRIBUTION
(REGULATIONS 2008)

Time: 3 hr

Max. Marks: 100

Answer ALL Questions

PART-A (10 X 2 = 20 Marks)

1. What transmission voltage standards are followed in India?
2. Name any two existing HVDC systems in India.
3. Why EHV lines are constructed using bundled conductors?
4. What is meant by transposition of line conductors?
5. What is meant by 'natural loading' of lines?
6. What are the advantages of shunt compensation?
7. State the advantages of suspension type insulators over pin type insulators?
8. What is the necessity of armour in cables?
9. What are the objectives of grounding?
10. What are the main equipments in a sub station?

PART-B (5x16 = 80 Marks)

- 11(a)(i). State and explain the main reasons to prefer HVDC transmission. (8)
- (ii). A 2-wire dc street mains AB, 600 m long is fed from both ends at 220 V. Loads of 20 A, 40 A, 50 A and 30 A are tapped at distances of 100 m, 250 m, 400 m and 500 m from the end A respectively. If the area of X-section of distributor conductor is 1 square centimeter, find the minimum consumer voltage. Take $\rho = 1.7 \times 10^{-6}$ ohm-cm. (8)
- 12(a)(i). Show that the inductance per unit length of an overhead line due to internal flux linkage is constant and is independent of size of conductor. (8)
- (ii). Fig.12a shows the spacing of a double circuit 3-phase overhead line. The phase sequence is 'abc' and the line is completely transposed. The conductor radius is 1.3cm. Find the inductance per phase per kilometer. (8)

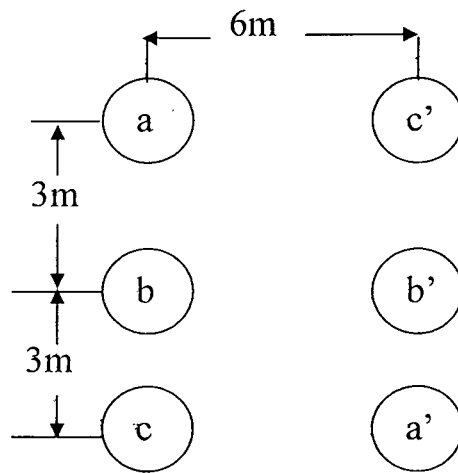


Fig. 12a

{Or}

- (b)(i). Determine the capacitance and the charging current per km when the transmission line is operating at 132 kV, 50 Hz and conductors arranged as shown in Fig. 12b. The conductor diameter is 0.8 cm. (10)

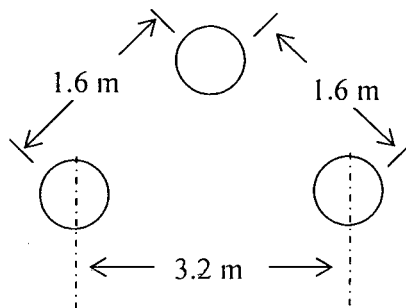


Fig. 12b

- (ii). Explain clearly the 'skin effect' and 'proximity effect'. (6)

- 13(a). A three phase 50 Hz over head transmission line, 100 km long has the following constants:

Resistance/km/phase = 0.1 ohm

Inductive reactance/km/phase = 0.2 ohm

Capacitive susceptance/km/phase = 4 micro semen

- Determine (i) the sending end current (ii) sending end voltage (iii) sending end p.f. and (iv) transmission efficiency when supplying a balanced load of 10000 kW at 66 kV, 0.8 p.f. lagging. Use nominal π method. (16)

{Or}

- 13(b)(i). Derive expressions for the sending end and receiving end power of long transmission line in terms of voltages and ABCD constants. (12)
- (ii). Explain clearly the 'Ferranti effect' with a phasor diagram. (4)

- 14(a)(i). Explain any one method for improving string efficiency of an insulator. (6)
- (ii). A suspension string has 3 units. Each unit can withstand a maximum voltage of 11 kV. The capacitance of each joint and metal work is 20 percent of the capacitance of each disc. Find the maximum line voltage for which the string can be used and the string efficiency. (10)

{Or}

- (b). What is grading of cables? Explain any two methods of grading of cables in detail. (16)

- 15(a)(i). What are the various methods of neutral grounding? Describe any one method in detail. (8)
- (ii). An overhead line at a river crossing is supported from two towers of heights 60 metres and 70 metres above water level with a span of 300 metres. The weight of the conductor is 1 kg/metre and the working tension is 2000 kg. Determine the minimum clearance between conductor and water and the position of minimum clearance. (8)

{Or}

- (b). What are the different types of bus-bar arrangements used in sub-stations? Explain any two arrangements in detail. (16)