

Printed Pages—3

TEE503

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2057


Roll No.

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B. Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION

2010-11

ELEMENTS OF POWER SYSTEM Time : 3 Hours

Total Marks : 100

Note : Attempt all questions.1. Answer any two parts : **(10×2=20)**

(a) Give reasons :

- (i) The voltage drop is a very important consideration in transmission lines but not in Distribution.
- (ii) It is necessary to use high voltages for transmission system.
- (iii) The tendency of corona formation is lesser in bundled conductors.

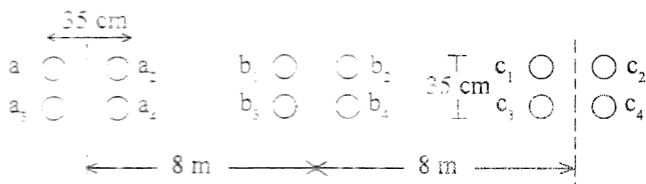
(b) Explain proximity and skin effect with their demerits.

(c) Explain ferranti effect mathematically and graphically for a long transmission line.

2. Answer any two parts : **(10×2=20)**

- (a) Derive expression of inductance in per phase per km for a fully transposed 3-phase line.
- (b) Determine the capacitance and inductance per kilometre length of a double-circuit three-phase line, as shown in

figure below the transmission line is transposed. The diameter of each conductor is 25 mm.



- (c) A short 3-phase 132 kV line is delivering 15 MW at rated voltage and 0.85 lagging power factor. The line loss is 7.5% of received power. If line resistance is 0.905 Ω /phase/km, find the length of line.

3. Answer any two parts : (10×2=20)

- (a) Detail out Audible Noise, Radio interference and Visual Corona.

Determine the Corona characteristics of a 3- ϕ line 200 km long conductor dia 1 cm, 2.5 m delta spacing, air temperature 27°C, altitude 2440 m, corresponding to an approximate barometric pressure of 73.15 cm, operating voltage 110 kV at 50 Hz.

- (b) What is an insulator ? Why it is used ? Classify them.
- (c) Each line of a 3-phase system is suspended by a string of 3-identical insulators of self-capacitance c farads. The shunt capacitance of metal work of each insulator is 0.26C to earth and 0.15C to line. Find string efficiency if a guard ring increases the shunt capacitance to line of the metal work of the lowest insulator to 0.35C.

Answer any two parts : (10×2=20)

- (a) Write short notes on any three :

- (i) Stringing chart
- (ii) Span length
- (iii) Sag template
- (iv) Vibration dampers.

- (b) A transmission line conductor is having a diameter of 20 mm and weighs 1.0 kg/m. The span is 280 m. The wind pressure is 40 kg/m² of projected area with ice coating of 10 mm. The ultimate strength of conductor is 1000 kg. Calculate the maximum sag if the factor of safety is 2 and ice weighs 910 kg/m³.
- (c) A single core cable has a conductor radius of 14.5 mm and an insulation thickness of 4.6 mm. Find the capacitance per meter length of cable if the dielectric has a relative permittivity of 3.2.

5. Answer any **two** parts : **(10×2=20)**

- (a) Draw the equivalent circuit of the HVDC link. Derive the expression for DC link current in terms of the firing angle at converter stations.
- (b) What are the advantages and disadvantages of HVDC system for transmission ? Describe in detail.
- (c) Explain Peterson's coil type of Neutral grounding.

A 220-kV, 3-phase, 50 Hz transmission line of 150 km consists three conductors equilaterally spaced with 7 m and having effective diameter of 3 cm. Find the inductance and MVA rating of the Peterson's coil in the system.