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EE53

Fifth Semester B.E. Degree Examination, June / July 08
Electrical Power Transmission and Distribution

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Why it is necessary to use high voltage for power transmission? **(05 Marks)**

b. Draw a single line diagram showing the essential parts in a modern power system network. **(05 Marks)**

c. Show that an overhead line conductor between two level supports takes up the shape of a parabola. Obtain expressions for the sag and maximum tension when the supports are at the same level. **(10 Marks)**

2 a. A transmission line conductor at a river crossing is supported from 2 towers at heights of 50 m and 80 m above water level. The horizontal distance between the towers is 300 m. If the tension in the conductor is 2000 kg, find the clearance between the conductor and water level at a point midway between the towers. Weight of conductor per meter = 0.844 kg. Assume that the conductor takes the shape of parabolic curve. **(10 Marks)**

b. Derive the expression for calculating the internal and external flux linkages of a conductor carrying current. Use these expressions to derive the equation for the inductance of a single-phase line. **(10 Marks)**

3 a. Determine the inductance per km per phase of a double circuit three phase transmission line as shown in Fig.Q3(a). The radius of each conductor is 1 cm. **(10 Marks)**

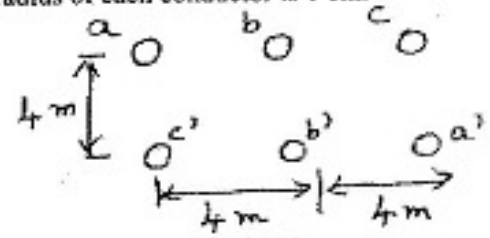

Fig.Q3(a)

b. Explain with reasons the presence of ground on the capacitance can be taken into account by the method of images, hence find the earth effect on the capacitance of single phase-line. **(10 Marks)**

4 a. Find ABCD constants for nominal π circuit of a transmission line. **(08 Marks)**

b. A 3 phase 100 km transmission line is delivering 50 MW, 0.8 Pf lagging at 132 kV. Each conductor is having resistance 0.1 Ω/km, reactance 0.3 ohm/km, and admittance 3×10^{-6} mho/km. Calculate the sending end voltage and regulation of the line using nominal T representation. **(08 Marks)**

c. Briefly explain surge impedance loading. **(04 Marks)**

5 a. Explain the methods used for improving the voltage distribution along the string of insulators in overhead lines. **(08 Marks)**

b. A string insulator has 4 units and each unit is having capacitance C. The pin to earth capacitance is C/10, find the voltages across each unit of the string, and the string efficiency. **(06 Marks)**

c. Explain briefly different types of insulators. **(06 Marks)**

6 a. Find expressions for the electrostatic stress in a single core cable. Where does maximum stress occur and where is it minimum and why? **(06 Marks)**

b. A single core cable for use on 11 kV, 50 Hz system has conductor area of 0.645 cm^2 and the internal diameter of sheath is 2.18 cm. The permittivity of the dielectric used in the cable is 3.5. Find the maximum and minimum electrostatic stresses in the cable. Find the capacitance of the above cable per km length. **(08 Marks)**

c. Write short notes on classification of underground cables. **(06 Marks)**

7 a. Discuss the phenomenon of 'Corona'. What are the various factors which affect corona? **(10 Marks)**

b. A 3-phase transmission line is having 3 conductors equilaterally spaced 6 m apart. The diameter of each conductor is 2 cm. The air temperature is 27°C and pressure is 72 cm of Hg. If the surface factor is 0.82 and irregularity factor is 0.9, find the critical disruptive and visual critical disruptive voltages. **(10 Marks)**

8 a. Explain different types of distribution systems with the help of neat sketches. **(10 Marks)**

b. i) Explain factors affecting the sag in transmission line
ii) Explain Power circle diagrams. **(10 Marks)**