



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Prof. Dr. Amany Hanafy

Course : Introduction to Power Eng.

Marks: 40

Course Code: EE 341

Time : 2 hours

Date : 15 / 1 / 2015

Final Exam

Answer the following questions:

1] A 220kV, 50 Hz, three-phase overhead transmission line. Each phase consists of a three bundles arranged in an equilateral triangle of 20 cm side. The three phases are arranged in an equilateral triangle of 7 m side. The conductor diameter of each bundle is 2 cm. Calculate:

- Inductance in H/m and reactance in Ω/m .
- Shunt capacitance in F/m and admittance in S/m.

(A.4 – B.2) (10 marks)

2] A 150 km, 50 Hz, three-phase transmission line has a series impedance $Z=0.3+j0.4 \Omega/km$, and a shunt admittance $Y=j4 \times 10^{-6} S/km$. The line delivers 250 MW at 220kV and 0.8 leading p.f. Using the nominal Π -circuit find:

- The line efficiency.
- The line voltage regulation.

(A.26 – B.11) (10 marks)

3] An overhead transmission line is supported between two towers with 250 m between them. Also, there is a vertical difference between the two towers of 10 m. There is an ice load of 1cm thickness and a horizontal wind pressure of 20 kg/m². The specific weight of the conductor is 0.006 kg/mm²/m and its overall diameter is 2 cm. The specific weight of ice is 1000 Kg/m³. The maximum tension must not exceed 10 kg/mm². What will be the position of the lowest point of the conductor and the maximum sag relative to both supports?

(A.4 – B.3) (10 marks)

4] a) An insulator string of five units. It is required to have equal voltage across each unit by using units of different capacitances. If the tower end unit has a capacitance 5C and the cap to tower capacitance is C, find the capacitance of each unit.

(A.4 – A.26 – B.11)

b)) Find the maximum working voltage of a single core, lead sheathed cable of core diameter 1 cm and an inner sheath diameter 5 cm. Two insulating materials are used. One has a maximum working potential gradient of 60 kV/cm and a relative permittivity 4, and the other has a maximum working potential gradient of 50 kV/cm and a relative permittivity 2.5.

(A.21 – B.2)

(10 marks)

Members of course Examination Committee	Signature	Date
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